Artificial intelligence tools in legal work automation: The use and perception of tools for document discovery and privilege classification processes in Southern African legal firms

By

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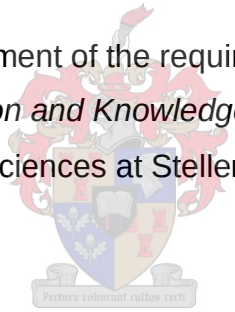

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Declaration

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Summary

The field of artificial intelligence is revolutionizing the way things are done. A significant number of innovations have been notable in many fields, ranging from medicine, media, agriculture, transport among others. This thesis presents a theoretical and practical analysis on the role artificial intelligence plays in shaping legal systems.

Notable innovations in the use of artificial intelligence in the legal sector have been experienced in countries such as the USA, Germany, the United Kingdom, Australia, and China among others. These innovations seek to improve operational efficiencies of justice delivery. Artificial intelligence has been used to predict decisions of certain cases, to model and design cases in order to produce a certain outcome, elsewhere it has been used in drafting contracts or in reproducing certain outcomes in similar types of cases.

This thesis therefore seeks to understand the extent to which artificial intelligence algorithms are currently being utilized in the field of the law. It further seeks to map and define existing tools, the nature of their operations and how they are being employed. To this end, a selection of artificial intelligence platforms that are available to the legal profession have been considered in this study. These include platforms such as RaveLaw, Deligence, Lexis Nexis, Ross Intelligence, DoNotPay, Aletras and Lex Machina. Lastly, this thesis has sought to discover the extent to which such platforms are used in Zimbabwe and South Africa, and whether there is already any understanding and appreciation of their benefits.

The thesis focuses on two primary aspects of the court process in which such platforms can be of service, namely privilege classification and document discovery. These are studied within the context of the court process taking into account the stages in which they occur, so that their key elements are identified. This approach has been taken because the procedures of privilege classification and document discovery are an integral part of the generic and standard court process for such procedural steps do not exist in isolation.

The thesis adopted a mixed methods approach in gathering the evidence and the results of which informed the findings. A key informant interview guide was developed, which was administered to participants, some who were involved in the designing of artificial intelligence platforms and others who worked for companies marketing such programmes. In addition to the key informant interview, a structured questionnaire also was administered to law firms to map out their understanding of the applicability of artificial intelligence in the law and to reveal current usage patterns.

Results from the data analysed suggest that there is generally a low uptake of legal artificial intelligence tools in Zimbabwe and South Africa. However, law firms have started to adopt artificial intelligence technologies to help improve legal service delivery. Results indicate the general appreciation of artificial intelligence algorithms in improving legal service delivery among lawyers; however, these results also show evidence of fears among lawyers that artificial intelligence is going to replace human beings, there is a feeling among respondents that artificial intelligence will take away their work and that such a threat should be resisted.

This thesis concludes by providing recommendations for effective utilization of artificial intelligence tools in the law. It suggests that developers should better inform prospective users to raise awareness to the potential of their systems and thus encourage their uptake. There is also need for a general training of users to ensure maximum utilization. Additionally, this thesis recommends customization of legal artificial intelligence platforms at common law jurisdiction level in order to ensure that the law, which is unique to each jurisdiction, is available in a customized format so that it may meet the requirements of each legal system at a local level.

Opsomming

Die veld van kunsmatige intelligensie revolusioneer die manier waarop dinge gedoen word en 'n beduidende aantal innovasies is kan in ‘n verskeie velde, onder ander van medisyne, media, landbou, tot vervoer, bespeur word. Die tesis bied 'n teoretiese en praktiese ontleding van die rol wat kunsmatige intelligensie in die regspraktyk speel.

Opvallende innovasies in die gebruik van kunsmatige intelligensie in die regsektor is reeds in lande soos die VSA, Duitsland, die Verenigde Koninkryk, Australië en China beskryf. Hierdie innovasies poog om die bedryfsdoeltreffendheid van die lewering van geregtigheid te verbeter. Kunsmatige intelligensie is byvoorbeeld ingespan om beslissings van sekere sake te voorspel, om sake te modelleer en te ontwerp vir bepaalde uitkomste, elders word dit in diens van die opstel van kontrakte of die weergee van resultate in soortgelyke hofsake.

Die tesis poog om te verstaan tot watter mate kunsmatige intelligensie algoritmes tans gebruik word in die regsdomein in Suider-Afrika. Bestaande instrumente en die aard van hul aanwending word in die tesis omskryf en definieer. 'n Seleksie van kunsmatige intelligensie platforms wat tot die regsberoep se beskikking is word beskryf en vergelyk. Dit sluit platforms soos RaveLaw, Deligence, Lexis Nexis, Ross Intelligence, DoNotPay, Aletras en Lex Machina in. Laastens probeer die tesis om vas te stel tot watter mate sulke platforms in Zimbabwe en Suid-Afrika gebruik word, en of daar in regsfirmas begrip en waardering vir die moontlike voordele van kunsmatige intelligensie is.

Die tesis fokus op twee primêre aspekte van die hofproses waarin sulke platforms van diens kan wees, naamlik pre-regsklassifikasie en dokument-ontdekking. Dit word binne die konteks van die hofproses, met inagneming van die stappe wat gevolg word, bestudeer om die kern-elemente te identifiseer. Hierdie benadering is gevolg omdat die prosedures van pre-regsklassifikasie en dokument-ontdekking 'n integrale deel van die standaard hofproses is en sulke prosedurele stappe gevolglik nie in isolasie beskou kan word nie.

Die tesis het 'n gemengde metode benadering gebruik om data in te samel vir die uiteindelike bevindinge. Onderhoude is gevoer met sleutel-informante wat bestaan uit ontwerpers van kunsmatige intelligensie platforms en verteenwoordigers van maatskappye wat sulke platforms aan regsfirmas bemark gestuur. Bykomend tot hierdie onderhoude, is ‘n gestruktureerde vraelys aan verteenwoordigers van regsfirmas gestuur om data oor hulle

siening van die toepaslikheid van kunsmatige intelligensie in die regswese en huidige stand van die gebruik van sulke stelsels in te samel.

Resultate dui in die algemeen op 'n lae opname van kunsmatige intelligensie instrumente in die breëre regswese in Zimbabwe en Suid-Afrika is. Regsfirmas het egter kunsmatige intelligensie tegnologieë begin gebruik om regsdienste te verbeter. Resultate onder prokureurs dui op 'n algemene waardering vir kunsmatige intelligensie algoritmes om regsdienslewering te verbeter. Die resultate toon egter ook dat baie respondente vrees dat kunsmatige intelligensie mense se werk sal wegneem en dat so 'n bedreiging weerstaan moet word.

Die tesis sluit af met aanbevelings vir die effektiewe gebruik van kunsmatige intelligensie instrumente in die regte. Daar word voorgestel dat ontwikkelaars voornemende gebruikers beter moet inlig oor die potensiaal van stelsels om sodoende wyer opname aan te moedig. Verder moet die algemene opleiding van gebruikers verbeter word om volle benutting te verseker. Daarbenewens word aanbeveel dat die regsplatforms vir kunsmatige intelligensie op jurisdiksievlak van gemene reg aangepas word om te verseker dat die wet, wat uniek is vir elke jurisdiksie, in 'n aangepaste formaat beskikbaar is sodat dit aan die plaaslike vereistes kan voldoen.

Acknowledgements

The process of learning is a gradual and never ending process. You can never say you know enough. This thesis has been a personal journey which I have enjoyed and I hope to continue drawing from it in many ways. It has shaped my vision for life, my future prospects and has given me motivation and has convinced me in my belief that if you want something you can definitely achieve it.

Firstly, I would like to thank my supervisors, Professor Tamm and Doctor Maasdorp for agreeing to assist with my research, it was a wild thought brought to reality. Your support, guidance and wise words made me work extra hard to complete this thesis. You gave me the kind of motivation that I have not received from many people.

To fellow students that were with me from the beginning of the journey, I say thank you. This started as a discussion but eventually the motivation to put it into a thesis came with your support. I have learnt a lot from you and I wish all your endeavours be made fruitful.

Lastly to Willma, Naledi and my family, thank you for the support and the motivation. You always tell me, quitting should never be an option in life. I know I sacrificed many days and nights from you. The product is there for you all to see.

Soli Deo Gloria

Dedications

I dedicate this work to my Father Paul. This is part of a journey you always wanted me to take, you gave me so much hope even though you left us while we were still young.

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Glossary of terms

Contract review	an In-depth examination of a legal agreement to ascertain its validity. It looks at everything stipulated in the agreement, to determine its accuracy, clarity and its litigious nature.
E-discovery	Refers to the discovery of electronically stored information for utilization in a particular case
Discovery	The legal procedures used to gather evidence needed in a case or in preparation of a trial in a particular civil case. is the formal process of exchanging information between the parties about the witnesses and evidence they'll present at trial?
Legal Prediction	Refers to the process of estimating an algorithms ability to generate reasonable legal arguments. This is based on precedent
Litigation	The process of instituting legal proceedings/ taking legal action
Obiter Dictum	The expression of opinion that is uttered by a judge in a court of law or in a written judgement. It is a line of reasoning or persuasion in a judgement but do not bind as precedent
Precedent	Refers to a decision by the court that is taken as authority for deciding subsequent cases involving similar legal issues or facts. In Zimbabwe and South Africa, all cases decided by the superior courts (High court, Supreme Court, Constitutional Courts and Specialized courts) automatically become precedent.
Privileged information	is information that is protected by a confidential relationship recognized by law, such as attorney-client. This information is typically not accessible under discovery at all
Ration Decidendi	A Latin maxim meaning the reason for the decision. It is the point in a case that outline the principle that the judge utilizes to make a ruling or judgement
Text Classification	The process of classifying legal precedent into various formats, analysable by algorithms. It also involves the process of grouping legal text by them, jurisdiction, rank and superiority as well and its persuasive nature.

Chapter 1: Background and Research problem

1.1 Introduction.

The gradual shift in the global economy from an industry-based economy to a knowledge-based economy has seen more investments in the field of technology and the so-called soft skills. This has impacted the labour value chain as more work systems have become automated to improve their effectiveness and efficiency. As a result, the field of artificial intelligence has also been at the forefront of the evolution of the knowledge economy through spearheading and speeding automation processes. Specific and important fields of artificial intelligence that have been radically transformed are machine learning, natural language processing (NLP), machine visioning (MV), robotics, and deep learning automation (DLA). Artificial intelligence makes work easier and faster and has already been integrated with so many aspects of human work and information systems, ranging from health systems, environment, and natural disaster monitoring systems, product recommendation systems- such as those using pattern recognition software to analyse shopping experiences of consumers-, automated surveillance, among other uses. Artificial intelligence is now being integrated in legal work, although the pace is slow due to fears of how computer systems may one day have the potential to replace lawyers. Most of the innovations on artificial intelligence in the legal sector have been in the specific area of contract drafting and legal research.

This thesis analyses artificial intelligence and how it has been adopted for use in the development of legal systems. It assesses how artificial intelligence can be utilized to improve the functionality of legal systems: more specifically in the document discovery and privilege classification stages of the legal process. The focus of the thesis is on how artificial intelligence can help condense legal work such that it becomes a more structured endeavor and thus bring about better access to justice.

The thesis focuses on those aspects of information systems that deals with predictive coding, knowledge representation, reasoning and logic, especially borrowing from artificial intelligence elements of machine learning and natural language processing. Samuel (2018) views artificial intelligence as a field of study that gives computers the ability to learn without being explicitly and continuously programmed. The concept of applying artificial intelligence in legal processes will be deeply interrogated in this thesis.

1.2 Background to the thesis

Computer based information systems generally should be able to perform basic arithmetic operations and describe the on/off or up/down dictates. The nature and form of such information systems work on the different principles of mathematics and engineering. These systems work by simulating computers in measurement levels, as well as binary coding systems and applied coding schemes to enable them to achieve maximum results from optimization processes. The rapid rise in the development of new computer systems and technologies present novel capabilities for solving existing and future problems; not only will they be able to predict solutions and find easier ways of doing work for the computer scientist, but even be of benefit for the ordinary user. With the passage of time, the advances in the development of computer information systems has changed the operational properties and mechanisms for computation making it perform faster, accurately and better. This creates the need for having artificially intelligent programmes which can be applied to any field, whether in science, art or commerce. Artificial intelligent technologies have the potential to improve human work by making it easy and comfortable.

1.2.1 Evolution of Artificial Intelligence

Mankind has for ages envisioned in fiction the coming up of a superhuman being able to think and act in its elemental and philosophical being like a human. Such a dream is being realized with the arrival and introduction of many artificially intelligent programs that have taken up traditional human-oriented tasks. This rapid change in technology in modern society has increased the number of technologies influencing human lives on a daily basis. One may mention in passing a few examples: already there aresome law firms that have started utilising artificial intelligent lawyers; and in the medical profession some medical institutions have started utilising artificial intelligent diagnostic machines, which can predict one's health condition more accurately than human physicians; while there are some mobile and internet companies that have developed artificial intelligence phones that directly and indirectly influence the life of the end users, where such assistants learn which applications people use most of the times and track the frequency of our journeys, including the routine nature of our lives, such that they are able to predict what we are going to do next. Ultimately, one can argue that we are living in the age of artificial intelligence, referred to as the age of automation among the circle of scholars in knowledge management. Such changes and developments in knowledge studies have transformed the way the world operates, transcended the vision of

future companies and remodelled human life it would seem to make more predictable and easily managed.

Artificial intelligence can be described generally as the automation of machines, making them able to perform tasks which generally require human intelligence. For example, driving a car, trading in stocks, treating and diagnosing a patient all are centred in the fundamental expression of human intelligence. Artificial intelligence is generally able to perform such tasks without a human being overseeing it. Artificial intelligence technology often utilizes big data to enable devices to learn to do precise tasks efficiently and then get them to improve their performance by means of machine learning algorithms, eventually becoming better even than humans at those tasks without any further computer programming. Most big companies are already using artificially intelligent platforms with learning and adaptation methods to offer unique personalized services and experiences to their clients. In such cases, artificial intelligence has proved more than capable to perform human-centred actions with fewer errors and accidents.

Artificial intelligence is further viewed as the study of cognitive processes using concepts, frameworks and tools of computer engineering and computer science. It is often characterized as a distinct branch of computer science with its origins in the mid-nineteen fifties (Gordon 2010). For example, in 1968 Marvin Minsky, one of the founding authors of artificial intelligence was quoted saying that artificial intelligence is the art and science of making machines implement things which would require the intelligence of humans. In this sense, one can note that the foundation of artificial intelligence is not determined by the task but on the feature of intelligence, the ability to reason, sense and react. All manner of intelligent behaviour by machines falls into the realm of artificial intelligence, ranging from playing chess to solving modern calculus problems, making new mathematical discoveries, and even analogue, and digital reasoning and knowledge discovery.

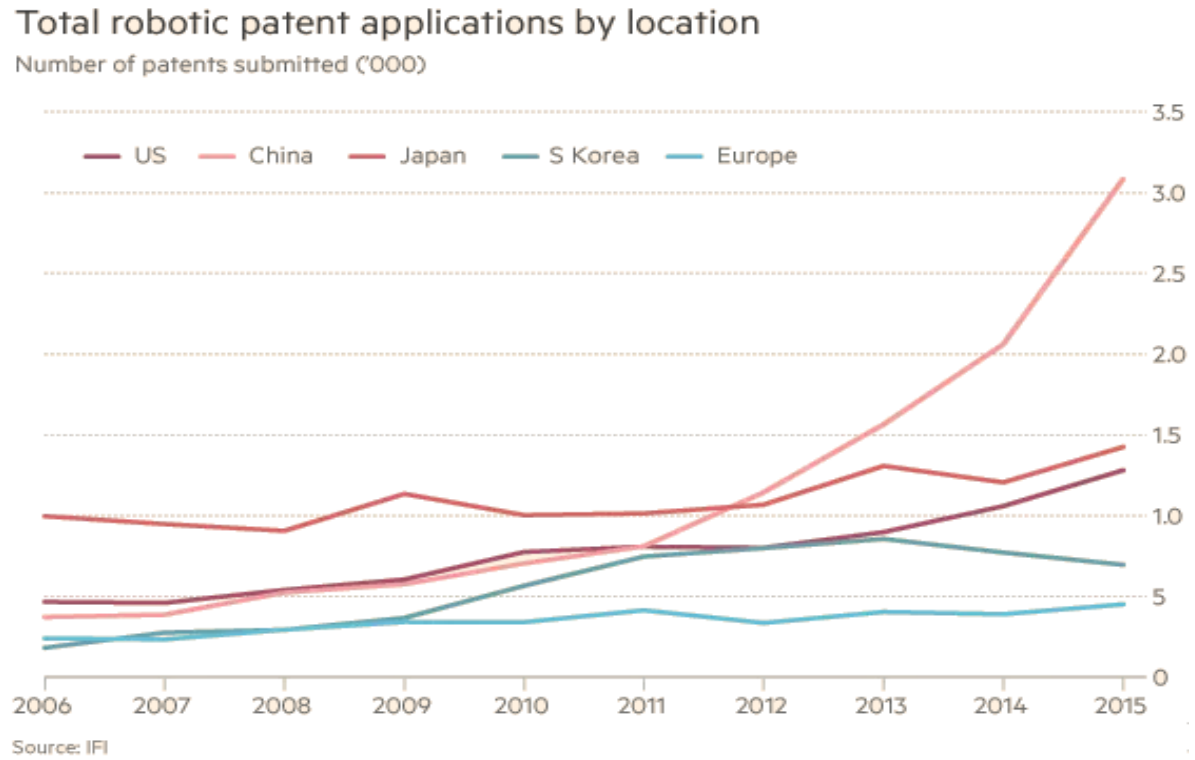
According to Rissland (2008), artificial intelligence is pursued for primarily two reasons, firstly to understand the workings and machinations of human intelligence; and secondly to automate and develop new computer programmes that are useful and can perform intelligently. Rissland (2008) goes on to say however that most people working in the field of artificial intelligence pursue such goals simultaneously, for example, while developing a program, the developer needs to relate and understand how people will make decisions based on it, and try to understand the source and etiquette of such information. The reasoning and intelligence part is

left entirely to the program but the data is fed into the software for learning. This forms the social aspects of technology.

1.2.2 Perceived Economic Benefits of Artificial Intelligence in the Global Economy

When asked about his views on technologies of the future, the industrialist, Elon Musk responded: sustainable energy, internet, genetic reprogramming, artificial intelligence and multi-planetary life[1]. It is generally accepted that these five key-areas will impact on mankind and disrupt the standard of life currently lived on. While it can be agreed that the internet and sustainable energy have been profoundly developed and invested in, the latter three remain lagging behind. Be that as it may, there has been greater progress of late when compared to earlier years; and it may be said that we have currently entered the age of revolution, that which some scholars have termed the knowledge revolution, which can be regarded as the newest phase of the industrial revolution. Some knowledge scholars have also referred to it as the fourth revolution. This revolution has seen gradual investments in the field of artificial intelligence which continue to rise.

Figure 1 - Annual patent filings for robotics



[1] Elon Musk is the founder or emerging car manufacturer Tesla. He is a keen innovator and is very much involved in developed self-driving cars that adopt Artificial Intelligence algorithms. The interview was conducted by the New York times in February 2020.

Data from Figure 1, suggests that annual registrations of artificial intelligence and robotic patents continue to rise and these have almost quadrupled with gradual investments in technology post 2015.

Over the past 10 years, the annual patent registrations for artificial intelligence technology has tripled. Between 2010 and 2014 the average increase in the sale of artificial intelligence machines was 17% per annum with 2014 having the largest year on year increase on 29% (Bradshaw and Waters, 2016). Venture capital investments in artificial intelligence then doubled from 2014 to 2016 amounting to more than $800 million according to Waters and Bradshaw(2016)[2], there are perceptions and indications that by the end of 2020, the artificial intelligence industry including venture capital investments will be around 150 billion dollars (Waters and Bradshaw, 2016). Such figures point to the fact that while artificial intelligence investments are still at the maturity stage, it is likely to become the most invested area technology-wise by 2030, with the potential to revolutionize every sector in the global economy.

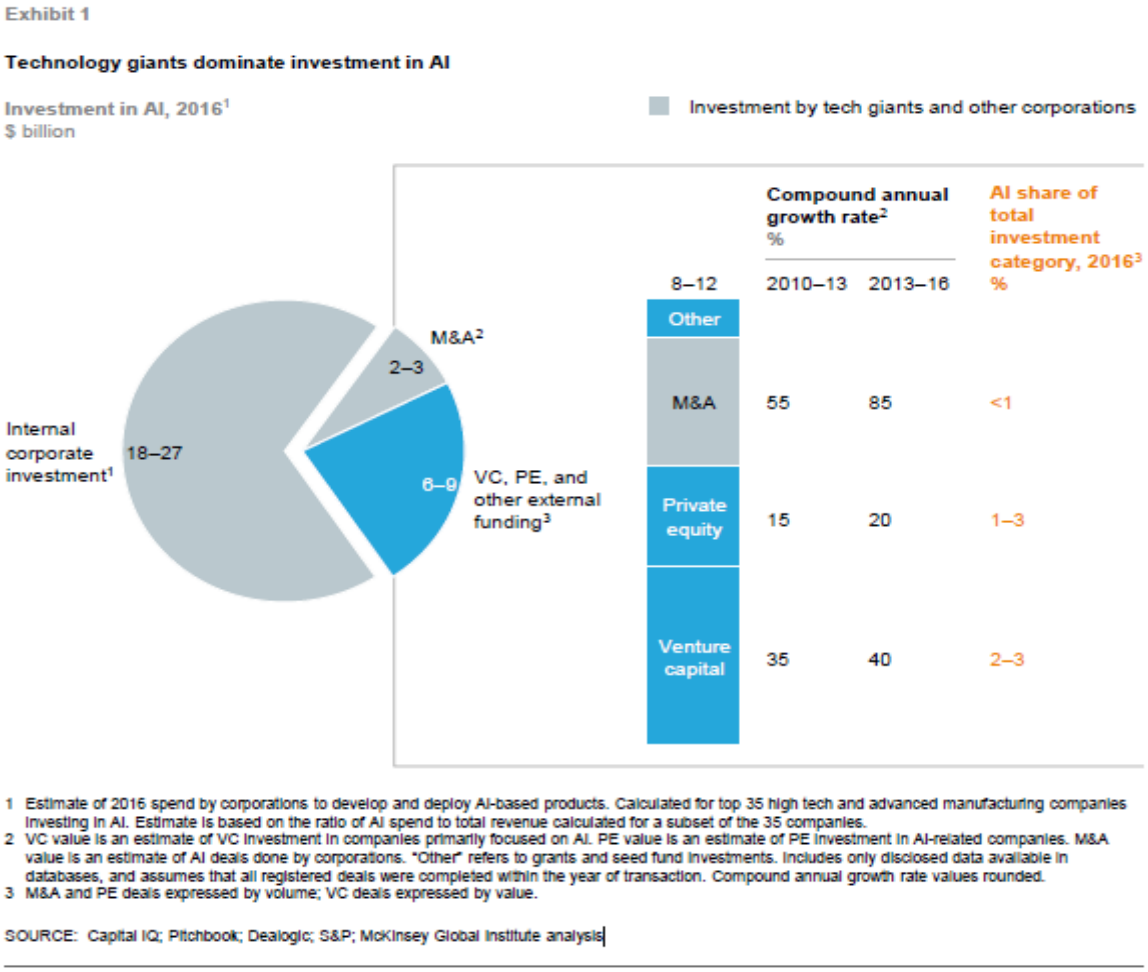
The huge attraction for the artificial intelligence industry can be explained by the dual benefits and expected benefits that would be produced, for example, at a corporate level artificial intelligence is expected to improve efficiency of firms and increase the return on investments through cost savings, as robots are generally considered to be an eighth of the cost of a full-time employee. Furthermore, through improved performance, artificial intelligence powered machines work more accurately and produce better quality and more optimized work, thus drive up productivity and minimize errors. In addition, machines are able to work long hours even in hazardous environments without incurring injuries or suffering fatigue, thus reducing the safety, health and environmental (SHE) concerns, mitigating social insurance. On a social level, artificial intelligence can contribute to development and advancements in high-end areas like transportation, medical care, legal work (by reducing the error rates, speeding up court cases and enabling case and knowledge sharing), and food production by making predictions on planting and harvesting times basing on climate and historical conditions date or automated seed fertility models among others.

2 Rise of The Robots Is Sparking an Investment Boom Financial Times . The article presents the general scenarios about how artificial intelligence is creating an investment boom and altering the way businesses think about investments.

1.2.3 Global investments in artificial intelligence

With the current interests in artificial intelligence, big technology companies have been scrambling to occupy the space and influence the development of programs. Top companies such as Google through their Google artificial intelligence lab, or Microsoft through Azure, or IBM through the IBM Watson have invested heavily in programs which have been utilized to transform the media, computing as well and many disciplines.

Figure 2: Global investments in artificial intelligence



With the advent of artificial intelligence, the human race is entering an unchartered territory and walking on a path which has never been tried before. The autonomous nature of artificial intelligence creates scenarios where there is need for discussions on issues of control and liability. With its potential to change and transform the current society, a proactive rather than reactive approach may be the only way of ensuring control and sustainability. But how that is

achieved remains obscure and that question will be pursued in this thesis, when looking at artificial intelligence and the legal industry.

While artificial intelligence has many disciplines, machine learning continues to be the most invested in discipline. Figure 2. pprovides an analysis of investments in artificial intelligence disciplines as provided by Mckinsey Global Institute analysis. The increased interest is a result of the potential noticed and opportunities that artificial intelligence brings to companies. Such global statistics show that aside from machine learning, natural language processing (NLP), computer vision, deep learning and autonomous vehicles are sharing the largest chunk of the funds invested in artificial intelligence each year.

Figure 3: Global investments in artificial intelligence disciplines

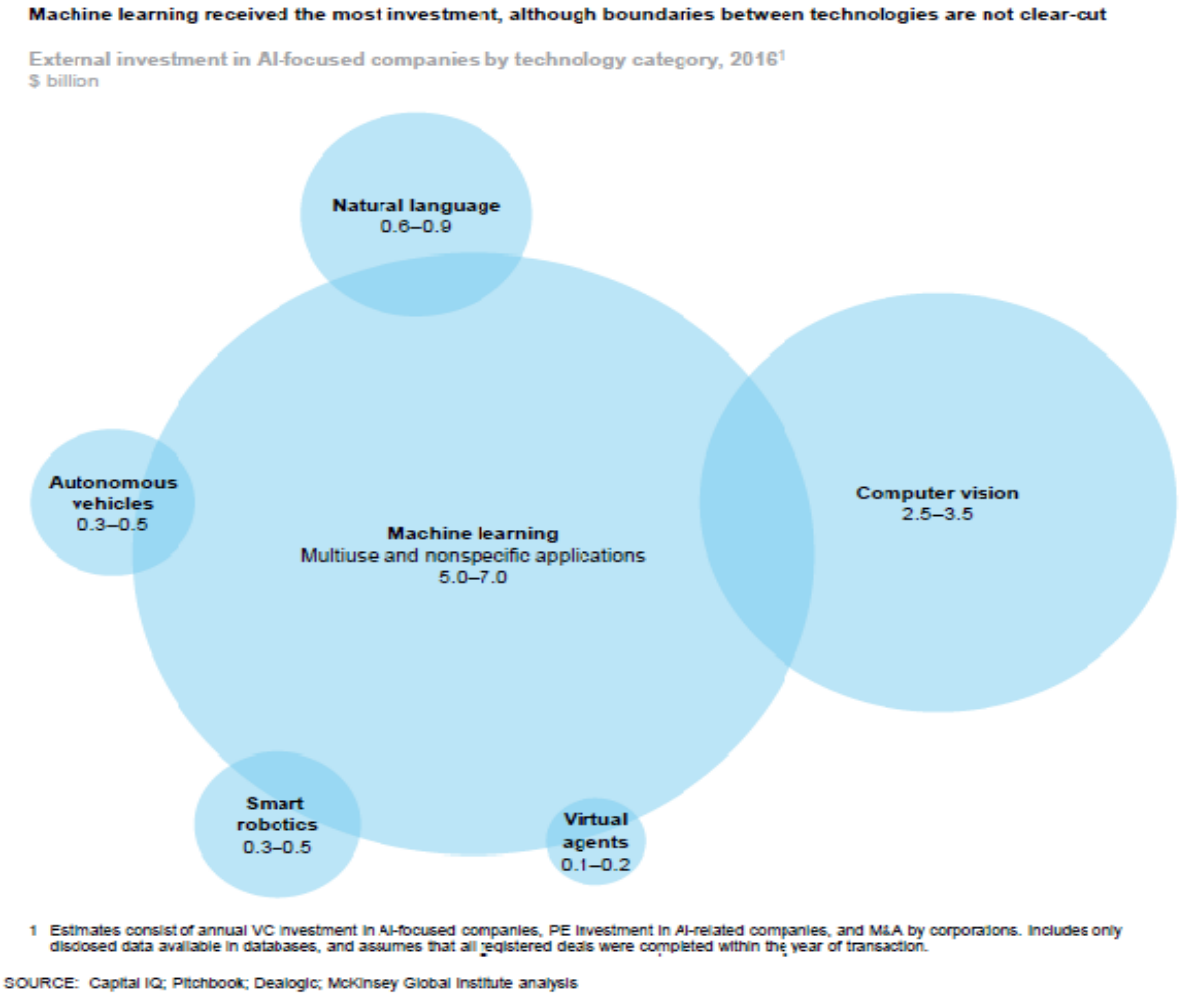


Figure. 3 provides a global outlook on the use and adoption of artificial intelligence technologies. Such use and adoption range from retail, manufacturing, utilities as well as healthcare. While investments in retail, media and health artificial intelligence are massive, in other sectors like the legal sector, it remains low.

Figure 4. Global usage and adoption of artificial intelligence

AI can help capture significant gains across the value chain

Examples of AI-related business impact from current use cases

	Project	Produce	Promote	Provide
	Accurate demand forecasting, smart sourcing, and enlightened R&D	**Higher productivity and minimized maintenance and repairs**	**Products and services at the right price, with the right message, to the right targets**	**Enriched, tailored, and convenient user experience**
Retail	▪ **1–2% EBIT[1] improvement** using machine learning to anticipate fruit and vegetable sales ▪ **20% stock reduction** using deep learning to predict e-commerce purchases ▪ **2 million** fewer product returns per year	▪ **30% reduction of stocking time** using autonomous vehicles in warehouses	▪ **50% improvement of assortment efficiency** ▪ **4–6% sales increase** using geospatial modeling to improve micromarket attractiveness ▪ **30% online sales increase** by using dynamic pricing and personalization	
Electric utilities	▪ Objective to **cut 10% in national electricity usage** by using deep learning to predict power demand and supply	▪ **20% energy production increase** using machine learning and smart sensors to optimize assets' yield ▪ **10–20% EBIT improvement** by using machine learning to enhance predictive maintenance, automate fault prediction, and increase capital productivity		▪ **$10–$30 savings on monthly bills** by using machine learning to automatically switch electricity supply deals
Manufac-turing	▪ **10% yield improvement** for integrated-circuit products using AI to improve R&D process ▪ **39% IT staff reduction** by using AI to fully automate procurement processes	▪ **30% increase of material delivery time** using machine learning to determine timing of goods' transfer ▪ 3–5% production yield improvement	▪ **13% EBIT improvement** by using machine learning to predict sources of servicing revenues and optimize sales efforts	▪ **12% fuel savings** for manufacturers' customers, airlines, by using machine learning to optimize flight routes
Health care	▪ **$300 billion possible savings** in the United States using machine learning tools for population health forecasting ▪ **£3.3 billion possible savings** in the United Kingdom using AI to provide preventive care and reduce nonelective hospital admissions	▪ **30–50% productivity improvement** for nurses supported by AI tools ▪ Up to **2% GDP savings** for operational efficiencies in developed countries	▪ **5–9% health expenditure reduction** by using machine learning to tailor treatments and keep patients engaged	▪ **$2 trillion–$10 trillion savings** globally by tailoring drugs and treatments ▪ **0.2–1.3 additional years** of average life expectancy
Education		▪ Virtual teaching assistants can **answer 40% of students' routine questions**	▪ **1% increase in enrollment** by using a virtual assistant to follow up with applicants	▪ **85% match with human grading**, using machine learning and predictive modelling

1 Earnings before interest and taxes.

SOURCE: McKinsey Global Institute analysis

Globally, a lot of legal business is transacting daily. Because the world is run by laws and policies which are modelled at the country level, governments are forced to constantly update, review and craft new laws in order to improve their administration and meet service delivery. Similarly, companies exist to provide services and therefore are expected to perform within the confines and boundaries of particular laws and policies. Consequently, a number of law firms exist solely to provide services to these companies, to the state, as well as to individuals who need legal support. In Zimbabwe and South Africa, most law firms and legal businesses are still limited in the support they get from technology and their processes are based on manual paper entry systems and procedures (Copeland, 2016). The legal process requires that a lawyer should be present to perform and approve every step of a legal process from the start to the end: from drafting, court appearance or in the capacity of being a business advisory representative (Remus, 2014). As a result, some legal processes are flawed, delayed or become too expensive, taking into consideration that lawyers transact by charging their client per hour (Allan Turing Institute, 2018). In developing countries, this results in the most indigent and low-income earners not being able to afford the services of law firms, (Copeland, 2016)

The thesis therefore, provides a basis for the development or improvement of artificial intelligence models by arguing that they can be utilized to create information systems which reduce the amount of time lawyers spend on the discovery and privilege classification processes. Further by creating systems that are based on machine learning, the computer has the ability to take on the tasks of legal researchers, paralegals and consequently reduce the bureaucratic nature of legal businesses, resulting in law firms becoming more productive and access to the law more sustainable (Mike, 2017).

In civil cases, there are court processes that are routine but compulsory in terms of the rules of civil procedure. These include instituting of court process (sending summons to commence an action, response and plea, case registration and documentation), as well the discovery of documents at the pre-trial stage (Matsikidze, 2018).

The thesis is a convergence of analysis of international practices in artificial intelligence and local (Zimbabwe and South African) practices in law. In the international arena, there are global leaders in the technology field using artificial intelligence, who have started generating solutions to improve the practice of law on an international level (Stuart 2016, Carlo, 2017, Forbes 2016), but such systems are only applicable in those legal jurisdictions, like the

American, British and German legal systems to which rules of procedure are different from South Africa and Zimbabwean legal systems. Therefore, it follows that harmonizing the legal and jurisdictional intellect regarding the common law status of countries will help create systems that can share lessons and are able to be implement at a global level. Such systems are able to perform better with adequate depth and detail borrowed from the global application of the law. Our choice for investigating the matter in the context of the South African and Zimbabwean legal system rides on the fact that both countries' legal system is founded on the Roman-Dutch legal systems (Madhuku, 2006).

While there is notable technological advancement in South Africa, with regards to improving the law, not much has been done at this point in Zimbabwe. The majority of the innovative technologies on the law in both countries are focused on creating virtual legal systems where clients interact with their lawyers via a virtual platform. This is still slower and expensive due to the ever-presence of lawyers as some of the elements of the work can be automated (Remus, 2014). Despite law firms dealing with extensive cases, some of which have huge volumes of data which can be best handled using big data algorithms, not much has been done to improve legal systems to ensure that such processes happen. This is due to insecurities around how much a computer can do and how it can replace human on the work (Balkin, 2017).

Artificial intelligence is viewed as a form of disruptive technology (McKinsey, 2016). This is because of its nature and role in influencing change in the way systems operate and perform (Basile et al. 2017). This context allows researchers and critics to view the role of artificial intelligence as a threat to global economies by reducing the human interaction needed to perform each transaction. However, in the current world order characterized by knowledge revolution and improvement in information flows, it is only prudent that legal business systems catch up like all other businesses that seem to have adopted and accepted the role of artificial intelligence in improving the effectiveness of business processes (Brüninghaus ,2009).

1.2.4 Adoption of artificial intelligence in law

New legal tools such as Ross intelligence, LegalLaw, Catalyst, among others, that are using natural language processing software, provide effective dispute resolution, legal clarity and quicker ways of achieving justice outside the conventional legal processes, yet at a cheaper rate (Rose and Semmler, 2018). This thesis looks at the current artificial intelligence processes provides suggestions on how natural language processing and machine learning techniques can be utilized to simplify and or replace complex legal tasks.

When looking at the evolution of law, one has to review it in the format of analogue materials, which include textbooks, case law material, law reports, law journals, delegated and parliamentary legislation. In most cases, these come in hard copies. Inquiring into such materials when a legal case arise takes time and is expensive, the cost of which is often borne by the litigant. With the advent of computer-aided technology, which has always been seen as a disruptive innovation, legal work has started to be automated and this has resulted in the creation of digital libraries, utilization of search platforms using Google, and regular subscriptions to digital libraries such as Lexis, Bloomberg, and the LIis (Legal information institutes such as the SafLIi, ZimLIi, CanLIi). This has resulted in increased access to legal information (Lindholm 2017).

The major difficulty with the legal sector is often that work is not completely autonomous, in most cases it is quasi-government institutionalized. This means that the part of it is controlled by government and is often created by statute. Much of the work done involves interacting with government agencies and institutions like the Deeds office, The Registries office, the office of Prosecutions and the Attorney General. The adoption of new technology often raises questions about disruptions and the threat it presents to labour (Rose and Semmler, 2018). However, looking at the value theory of labour redundancy it remains to be seen whether some tasks performed by humans in the legal sector can be automated and the labour assigned to that can be reassigned to other tasks important in delivery effect and efficient dispute resolution for litigant cases (Saad-Filio, 2018). This is because automating legal work is considered disruptive and in the end presents a challenge to the status quo. Adopting them will likely result in changes in the labour value chain. Some people are bound to lose their jobs and such a threat is not generally taken lightly. The question of retraining, addition of additional skills or reassignments to those that are affected by this disruptive technology remains equally important.

1.3 Statement of the problem.

Whereas adoption of artificial intelligence technology is on the rise in technologically developed countries, its adoption and utilization remains significantly low in developing countries. Further, while technology can improve the lives of people in multiple ways, it brings its own share of challenges. In legal work, artificial intelligence has been used specifically in contract drafting and drafting of court documents for civil litigation. The nature of the rules for

coding are simple and easy to follow. It is easier to make a computer learn and unlearn rules of contract drafting, as they are clear and linear. However, when it comes to learning and computer-aided predictions less has been done in the developing countries; and there the practice has remained centred on human/ attorney interaction often resulting in delays and justice becoming expensive.

The critical element is that discovery and privilege classification remains an essential party of any civil litigation, through which rules of civil procedure require a case to pass through. To add to that, issues of privilege and discovery have a critical human error component, suggesting that computers, if programmed well and operationally sound, can do it better than humans. It therefore follows that applying artificial intelligence to the improvement of such systems will increase access to justice, save the costs in lawsuits and make the cost of lawyers easily accessible to all litigants. Automating aspects of the law like the discovery and privilege classification process reduces tedious legwork for lawyers resulting in them handling more cases and increasing their casework ratios.

Artificial intelligence does offer a future survival strategy for law firms and legal businesses. However, it does not offer an independent solution to survival. Embracing it and integrating it fully into legal businesses will help law firms meet their current and future challenges well prepared and open doors for innovative legal service provision. It thus remains to be seen how much effort law firms and legal tech companies will put in in the form of investment, time and buy-in to support the radical development of artificial intelligence in the legal sector.

Throughout the world, topical discussions in the legal arena have often included how predictive justice and artificial intelligence systems could be made use of for judicial reforms and improvement in efficiency and productivity. Of importance in this debate is how the judicial systems will in the future rely on technological advances without themselves being subjected to change, so that the operation of justice can remain justice and be based on existing moral principles derived from social life rather than machine-automated decisions, and that morality remain as it is, based on the recognition, respect, and value of rights. The major challenge thus has been on how to leverage benefits off disruptive technologies like artificial intelligence, while ensuring that judgements on human life remain largely decided by the highest human values. Such a challenge however needs to be reconciled with ever-increasing expectations of efficiency, value for money and quality service delivery from the legal sector.

1.4 Thesis objectives:

The overall thesis objective is to assess the extent of knowledge of artificial intelligence and how such knowledge has been utilized to improve legal service delivery. In doing so the thesis aims to examine the existing artificial intelligence platforms and the extent of their use in the legal practice.

The sub-objectives include the following:

- To examine the extent to which artificial intelligence works in discovery and privilege classification.
- To examine the applicability and level of utilization of artificial intelligence by law firms
- To understand the risks and challenges that come with embracing artificial intelligence in the legal sector.
- To proffer recommendations for effective utilization and adoption of artificial intelligence in privilege classification, document discovery and other important legal processes

1.5 Research questions

The main research question for the thesis is:

What artificial intelligence tools exist and how are they being adopted by the legal practice globally, and in Zimbabwe and South Africa?

The thesis is premised upon the following research questions:

- How much knowledge of legal artificial intelligence applications exists in law firms, how has it been utilized to improve legal services?
- Are lawyers and the legal practice prepared to embrace artificial intelligence technologies in their day to day work?
- Does artificial intelligence present new opportunities for improving legal work? How much of the legal work can artificial intelligence and robots take away from lawyers?
- What is the context through which artificial intelligence can improve legal systems in document discovery and privilege classification?
- What can be done to improve adoption and utilization of artificial intelligence in law firms in South Africa and Zimbabwe?

1.6 Methodology

The study approach anchors on three methodological issues namely, Case studies, Primary data collection (administering survey questionnaires and key informant interviews) and literature review. The study begins by reviewing existing literature which then provides the nexus with case studies. This is done in Chapter 2. The study then collected primary data through a survey and key informant interviews. A detailed analysis of the primary data collection methodology is provided in Chapter Three of the study. Chapter four the presents the results of the primary data collected. Such data is analysed and contextualized to fit in the focus provided by literature review and case study as the data was collected on specific cases and artificial intelligence tools used for legal automation.

1.7 Assumptions

The thesis seeks to prove the assumption that: artificial intelligence plays a critical part in transforming legal systems and legal processes. If lawyers and law firms do not adapt, in the next few years, they are likely to lose out on business due to inefficiencies and delays in information processing. This will reduce significantly the number of law firms. Further it can be assumed that law firms and law firms in developing countries are not taking advantage of the opportunity presented by artificial intelligence and this is likely to remain so extensively for another generation. This makes legal work in such countries remain labour intensive.

1.8 Scope and delimitation

This study has been conducted within the scope of law firms; with a comparative approach between Zimbabwe and South Africa law firms. Very few Zimbabwe law firms have embraced information technology beyond databases, excel sheets, and search engines; as such very little data is expected from there. South African law firms have already started the process of active engagement with this type of technology and provide an opportunity for learning about it, and as such form the crux of the research. This thesis made use of case studies from already existing initiatives drawn mainly from European or USA experience. The obtained data was triangulated to derive conclusions thereof.

1.9 Limitations

The Thesis adopts a research focus which is anchored on three methodological elements namely; the analysis of existing literature (Literature Review), Case Studies and Primary data collection (administering survey questionnaires, and key informant interviews). It is difficult to obtain data that can be triangulated and cross-referenced with the three methodological elements. To alleviate the challenge, the researcher ensured that survey questions are based on the practical elements derived from the case study methodology in order build up an incremental approach to the analysis.

Huge operational costs affected mobility, resulting in the use of emails and Skype-web calls to collect data. The geographical area of this thesis comprised two countries (South Africa and Zimbabwe) the researcher utilized public transport systems to commute between the two countries and sought extension days from work in order to work well within the timelines of the project.

1.10 Chapter summary

This chapter presented the background and motivation to the thesis. It started from a perspective of artificial intelligence use and adoption in the global perspective and narrowed down to adoption and use of artificial intelligence in the legal profession. The problem statement has given focus on the limited adoption of artificial intelligence tools by law firms in developing countries, as well as the complexities around the adoption of such technology. It further explores the potential of artificial intelligence products to improve legal efficiencies and reduce the cost of accessing justice by automating discovery and privilege processes. The chapter also provided the objectives of the thesis and stated the hypothesis which the thesis seeks to prove. This forms the basis of the discussion in the next chapter.

Chapter 2: Literature review

2.1 Introduction

In the current global knowledge economy, many legal systems and courts are encouraging and promoting accessibility and use of publicly accessed information and they are also publishing decided and precedent cases online for public availability. The room for the automation of legal data has been left wide open. The role of technology in the legal sector is not however a new thing as automation did start in the early 1990s with organizations such as Westlaw and LexisNexis, which existed as search databases. However, in the current knowledge economy, machines have attempted to summarize legal information and begun the extraction of information (for example DecisionExpress2) or to categorize legal resources (for example BiblioExpress, Zimili) and have been for statistical analysis of legal information, using techniques like Statistic Express.

According to Remus (2014), advanced predictive coding tools, such as Language Express, have been adopted and utilized in the legal domain for quite some time, although the extent of codification is still limited. In earlier times, there were tools such as the Unabomber (Bentely, 2018) which used a manual form for analysis, but these tasks can now be performed statistically using machine learning software, which has the ability to identify categories (Basile 2017). Such categories include gender, age, personality traits, lines of reasoning and the software is able to predict possible case outcomes with a 68% success rate (Golbeck, et al. 2011)

This chapter looks at previous work using a case study methodology to analyse and discuss existing use of artificial intelligence in legal work; and furthermore how that can be idealized to look at specific aspects, such as on document convention and privilege classification. It further seeks to address the potential of utilizing language analysis and information extraction methods in order to facilitate efficiency in computational research in the legal domain. More importantly, this chapter seeks to demonstrate the ability of machine learning and natural language processing algorithms to automatically predict privilege and discovery outcomes in legal work.

The chapter further reviews literature on how machine learning can perform quantitative and qualitative analysis on the basis of words and information, as well as phrases and chats taken from client information and previous case outcomes and used to learn and predict certain elements of legal functionality, like predicting the decision of a court on certain kinds of cases, or recommending certain actions based on precedent.

Several studies have been made to conceptualize and define what artificial intelligence (artificial intelligence) is including its role in the ever-changing world. Because of the gradual shift in technology and the rapid pace through which the world has entered into the knowledge economy, artificial intelligence has been infused into several dialectical studies, that is involving health, insurance, engineering among other professions.

2.2 Defining artificial intelligence

Artificial intelligence refers broadly to intelligence which is exhibited by machines (Gordon, 2010). Such a definition should be easy to conceive, however, the problem only comes in with defining intelligence, and then the question often raised is whether human intelligence and machine intelligence are the same; and whether a machine can exhibit consciousness in the same way as a human being (Smith and Shum 2018).

Throughout the history of the study of knowledge, several scholars have tried to provide an answer to this question. Turing (1950[3]), suggested that rather than focusing on the question, "can a machine think?", the question should be on whether a machine is able to convince a human. In order to answer the question, Turing suggested it has to pass a test; the Turing test. The Turing test involves convincing a human who is not aware that he is speaking to a computer that he is communicating with a human. If a computer behaves as intelligently as a human, then it is intelligent as a human being. The question is important when studying the concept of artificial intelligence in the field of law which is highly technical and specialized, it is always important to determine if the computer can act intelligently as well as determining whether the extent of the intelligence befits or can fit in with the reasonable man concept, which is the thrust of many modern day legal systems[4].

There are many definitions for artificial intelligence, which however mostly depend on the field of artificial intelligence being discussed. However, what is common to all these definitions are those issues related to the cognitive element of machines, their association with human intellect as such, and that complex mesh involving the process of problem-solving and solutions

3 The Beginning of Artificial Intelligence. Allan Turing is globally celebrated as having influenced the development and laid the foundation of machine learning. His contribution in assessing if computers can think largely influenced the development of current legal analytics.

[4] The reasonable man concept is found in many legal jurisdictions. It is used to define the extent of liability mostly in delictual cases. Here it is assumed that the behaviour of a men subject to test should be of a reasonable man. That is the standard action of a person should be enough to fit an ordinary person of simple intellect who is able to view things clearly. additionally, in the study of machines, they are aspect to act at least to the standard of a simple man, without expect skill but with adequate reasoning.

generation as well as learning. For the purpose of this thesis artificial intelligence is defined to include issues of intellect, learning and solution generation. The key traits include reasoning, problem-solving, knowledge representation and modelling, natural language processing, machine learning, object manipulation and recognition of both motion and patent, creativity and design intelligence. Any software or program able to perform such tasks falls under the recognized working definition of artificial intelligence in this study.

Table 1: Key forms of artificial intelligence

Artificial intelligence				
machine learning • Deep learning • Predictive analytics	**natural language processing (NLP)** • Translation • Classification & Clustering • Information Extraction	**Speech** • Speech to Text • Text to Speech	**Expert Systems** • Missile System • Radar System • Drone System • Custom Build System on base Linux kernel • Home and Office Appliance Systems	**Planning, scheduling & optimization** • Data Analysis Approaches • Achieve a new level of efficiency • Optimal input and Better outcome • Decision on Timelines
Robotics • Algorithms for Functions • Control and Perform Tasks • Sensors • Motions	**Vision** • Image Recognition • Machine Vision	**Guided Systems** • Weather • Earth landmarks • Distance • Measurement • Archive Targets • Global Maps	**Artificial intelligence Network** • Encryption/Decryption • Connectivity • Reestablishment Communication • Smart Data Transferring • Artificial intelligence Real-Time embedded • Army Defence/Attack/Spy Systems • NASA Space Projects Devices	**Scientific and Artificial Intelligence Real-time embedded** • 4CAPS • ACT-R • AIXI • CALO • probabilistic logic, planning, reasoning • CHREST • CLARION • CoJACK • Copycat • DUAL • EPIC • FORR • IDA and LIDA • OpenCog Procedural Reasoning System

			• Vehicles, Flying Objects	• Psi-Theory • R-CASTSoar • Society of mind Subsumption architectures
Healthcare • Surgery Machines • Monitoring Equipment • Medicine development • Diseases recognizing • Virtual Doctor • Tracking and Analysis Record • Research Advancement Assistant	**Automobile** • Transportation directing • Tracking and Driving • Controlling subsystem • Eye on Environmental changes • Search and Optimization Path	**Engineering** • Building Models of Probability • Intelligent Calculations • Manufacturing Controlling • Performing logical test • Product Logic, Reasoning & Planning	**Searching** • Variations of A* • Bidirectional search • Iterative deepening • Beam search • Dynamic weighting • Bandwidth search • Dynamic A* and Lifelong Planning A*	**Finance** • Alpasense • Cerebell capital • Datamir • Isentium • Kensho • Quand1 • Reducing Fraud and Fighting Crime • New Management Decision-making • Personalized Financial Services

Source: Qumber (2017[5])

2.3 The scope of artificial intelligence in Knowledge Management

The thesis is conducted within the bounds of the discipline of knowledge management. The primary considerations for it are on improving legal knowledge generation and sharing. It is thus important to begin by looking at how artificial intelligence is contextualized within the field of knowledge management. Artificial intelligence is often seen by scholars as transforming the field of knowledge management (KM) and the subject leading the knowledge revolution. Its outputs and processes have made the process of knowledge generation and modelling easier (Chen and Chai, 2016).

5 Adapted from an Artificial Intelligent Operating System Architectural Design on Organic Computing Architectural Design: Boundaries of Artificial Intelligence and Organic Computing Structure by Shahzaib Abbas Qumber.

According to Smith and Faquar (2014), artificial intelligence in its broad-spectrum application has enabled quicker processes and led to decision making taking place in real-time. The outcome of such a virtual machine process is arrived at sooner, without the wasted time due to real-world human analysis, and is therefore more productive.

Tsui et al. (2016), views knowledge management as a field and discipline which encompasses processes and techniques utilized to "create, collect, organize, index, distribute and evaluate institutional knowledge to improve performance and the exploitation of intellectual capital included for re-use and design". They further posit that to establish knowledge management processes that cover the said aspects, human resources and cultural issues must be considered together with the development of intelligent systems that enhance the practicality, performance, and execution of the predominantly increasing knowledge-intensive tasks which organizations are grappling with today.

To correctly understand the role of artificial intelligence in the knowledge management field, Tsui et al. (2016) posit that there are recurring questions with which artificial intelligence researchers in the knowledge management arena are often faced.

The first question is, after decades of research in knowledge management and engineering, how can knowledge management be best defined?

Knowledge engineering as a sub-branch of knowledge management has a more technical focus on knowledge, and this is where artificial intelligence is more focused on knowledge management processes. (Knowledge representation, knowledge organization, knowledge reasoning, knowledge modelling and searching among others). This feeds into specific knowledge management which is more aligned to capturing and utilization of knowledge patterns and trends for the benefit of a firm or organization.

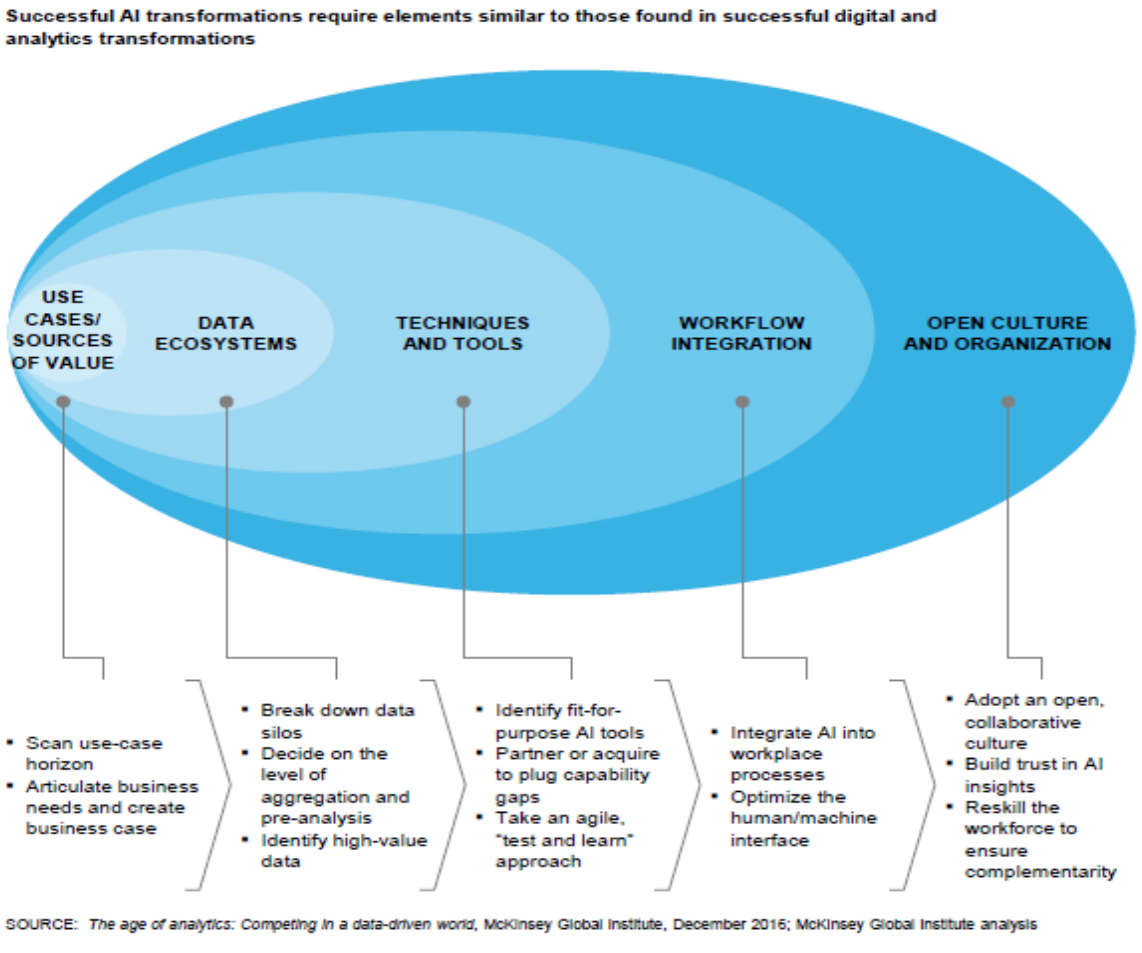
Sanogni et al. (2017[6]), argues that although knowledge management can proceed without knowledge engineering efforts, because some techniques developed in the knowledge engineering area are analogous to micro knowledge strategies, and most knowledge management processes are considered macro knowledge management strategies, however, ideally all knowledge management processes should be technology-driven and embrace some

6 Artificial intelligence and Knowledge Management: Questioning the Tacit Dimension. In this article Sanzogni, argues that although the field of artificial intelligence developed early before knowledge management, the interdisciplinarity enable artificial intelligence to be deeply embedded into the knowledge management field.

knowledge engineering processes such as artificial intelligence-based or web-based execution rules to add value to knowledge processing efforts.

The second question often raised about artificial intelligence in knowledge management is about the readiness of technology and how it can converse with humans. Some knowledge management experts like Gaines (2007) consider that technology is ready to embrace human knowledge and drive essential features of human development. Some scholars like Liebowitz (2009: 6) believe the more complex and difficult knowledge processes can only be understood in the language of natural reasoning. Their arguments, however, seem to defeat the essential purpose of natural language processing which argues that there can be a complex but intricate relationship between natural reasoning which is deontological and based on learning. In such regard, it is thus able to embrace the essential features of human reasoning and embed it as a core processing element for the artificial intelligence algorithm.

Figure 5: Adoption of artificial intelligence and integration in modern business information systems



Furthermore, the most sophisticated and complex knowledge management tools are generally embedded and programmed to utilize some forms of artificial intelligence technology such as Bayesian Reasoning, data mining, machine learning, and ontologies (Chien, 2011). These are now often used in various parts of business processes which are knowledge-intensive such as user profiling, document search, and conventions, personalization of high-end computer user interactions, case-based retrieval techniques as well as content analysis and management.

Scholars like Lee, et al. (2016), have shown a strong interest in artificial intelligence techniques like searching and retrieval of information based on the internet or intranet and core subject formulations. Other scholars like Smith and Farquhar (2003) have looked at potential benefits that artificial intelligence provides for core knowledge management processes like knowledge discovery (interest profile mining, common interest connections in business models), Knowledge indexing and representation (such as modelling and prototyping existing tacit and embedded knowledge to formulate and derive new knowledge). However very few practical components of knowledge management and artificial intelligence have been embedded in legal business processes, and knowledge processing and modelling in the legal field have largely remained an unexplored territory (Armistead and Meakins, 2002). This has often resulted in very few codes and technologies being developed to resolve legal problems.

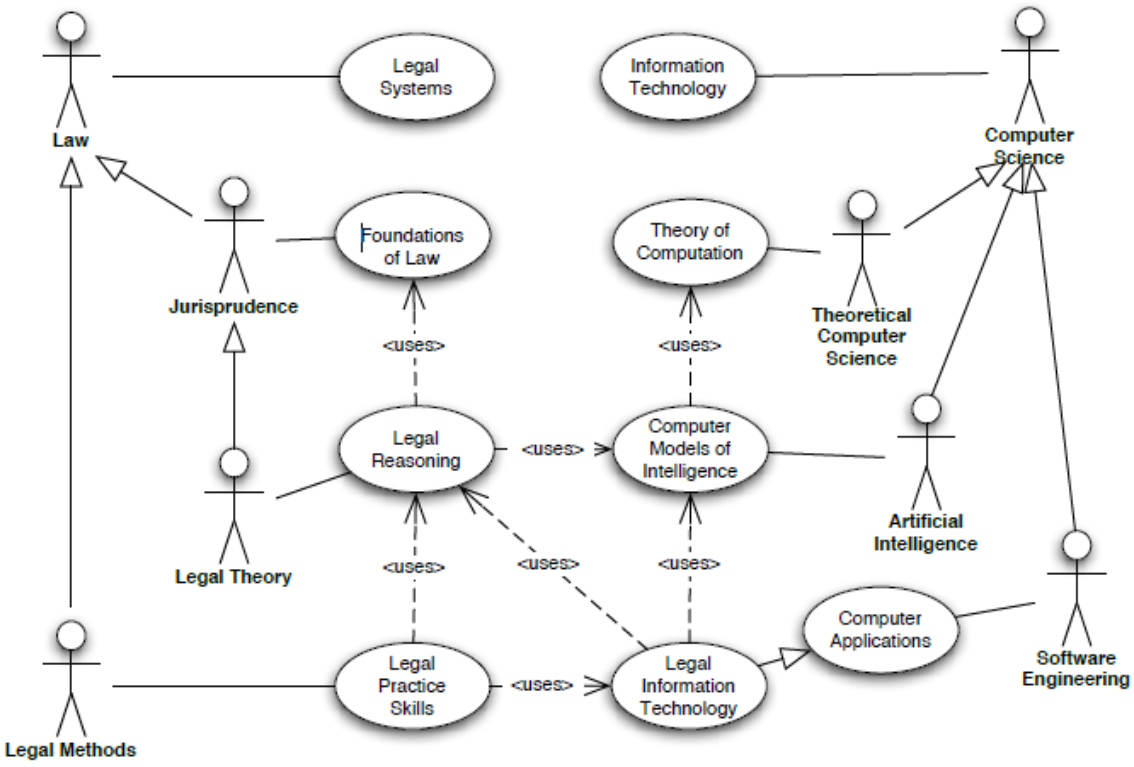
According to Kerber (2016), since knowledge management is an intensive process, which involves sharing and transforming individual knowledge trends and patterns into collective knowledge, artificial intelligence plays an important role in helping to push these basic elements of knowledge management. If one is to look at knowledge representation and capture, the knowledge engineering methodologies for developing expert systems have utilized knowledge acquisition techniques such as protocol analysis, simulation, card sorting, for eliciting tacit knowledge from several domains (Hendriks and Vriens, 1999). Further Kerber (2016), has posited that knowledge engineering has also been adopted to process knowledge repositories in knowledge management systems for documenting and modelling knowledge.

Knowledge discovery and data mining approaches have been used to effectively determine relationships and trends for creating new knowledge. Such approaches have been utilized for building expert systems such as natural language processing technologies like LegalLaw. In the field of law, this has resulted in the development of contract management technologies such as Diligence (De Jaegar, 2017).

2.3.1 Opportunities for artificial intelligence in law

Artificial intelligence technology continues to present new opportunities for improving legal systems. Figure 6 below presents an interactive explanation between law and technology, it further shows that the knowledge-intensive legal processes at third and fourth degrees are IT-oriented processes. This becomes according to Ross (2017), the epitome of legal revolution as legal processes become automated and theories of computation are applied using algorithms like natural language processing and machine learning to help deduce and classify legal elements into easily adaptive categories.

Figure 6: Legal information system and its link with artificial intelligence



Source: Gordon (2010)

2.4 The scope of artificial intelligence in legal processes.

Artificial intelligence in the context of the legal sphere is often perceived as the application of technologies such as machine learning, natural language processing, speech recognition, legal

robotics, natural image understanding, logical programming, artificial vision as well as neural network theories to resolve legal issues (Remus, 2016). In the legal business, artificial intelligence has often been welcomed because of its ability to assist in dealing with large amounts of data and because it provides often more accurate results since they are tested using more thorough machine-based means. Some scholars like Donahue (2018) have argued that artificial intelligence is being considered in the legal practice due to its ability to speed up legal processes and often being able to assist lawyers to realize more value and results in their legal work as a result of its operational efficiency and ability to reduce drudgery. Kerber (2016), has posited that artificial intelligence in the legal sector has shown important results in the use of different applications such as case-based logical reasoning, document modelling, deontic-logic, conceptual content retrieval, and intelligent tutoring.

Furthermore, machine learning has been utilized in legal practice more than other artificial intelligence applications. Examples of such subjects include contract drafting tools in which learning of neural networks occurs through analysing the huge amount of statistics to derive general patterns and techniques.

According to Yanda (2016), artificial intelligence plays a significant role in improving the effectiveness of business systems. In legal businesses, artificial intelligence-powered software helps to improve the efficiency of document analysis for legal use, and machines can review documents and flag them as relevant to a case. Once a certain type of document is denoted as relevant, machine learning algorithms can get to work to find other documents that are similarly relevant. Machines are much faster at sorting through documents than humans and can produce output and results that can be statistically validated (Remus 2016). This role is, however, limited, as it can be argued that artificial intelligence can play a much bigger system in the procedural aspect of legal business, rather than simply only focusing on document convention, conversions, and analysis. Existing artificial intelligence models that help improve legal business processes include Ross Intelligence and Diligence. However, these are modelled for the law of contract. They are mostly fit for use in the American legal systems. Conceptualizing it for the African Roman-Dutch legal systems presents a great opportunity for adoption and utilization.

Very few studies on artificial intelligence and the law have been done, this can be attributed to the complexity of the two fields, as well as the inadequacy of academic skills to foster or encourage in-depth research into these two distinct fields. According to Gordon (2010),

currently, artificial intelligence and the law is an interdisciplinary field somewhere on the border between computer engineering and the law, he argues that for many years, this interdisciplinarity has hampered its development and transfer of results into both legal theory and legal practice. Gordon (2010) further puts it that for effective infusion, artificial intelligence should become part of legal jurisprudence to enable the field to become an integral part of legal and academic research.

According to Lindsay (2016), there are key and fundamental benefits of adopting artificial intelligence in the legal business. From his perspective, law firms are businesses, often with revenue running into hundreds of millions of dollars and massive data amounts. That data when mined and evaluated through artificial intelligence can help law firms improve customer service, attract and keep more clients, reduce the risk as well as make the law firms leaner and more profitable.

A study by Baker (2018) on legal technologies found out that only 22% of law firms in Europe and Africa have adopted 51% of the market share of legal technologies. This is significantly low. However, the amount of investment put in is considered massive and still growing.

Figure 7: Utilization of artificial intelligence in law

Field of Law	Tools Serving
Criminal	51%
Family	31%
Consumer (including bankruptcy)	25%
Real estate	23%
Civil Rights	23%
Employment	22%
Housing	22%
Health	21%

Notes:
N=322 technologies

Source: A survey of legal technologies[7]

7 Legal Tech for Non-Lawyers: Report on the Survey of the use of Legal Technologies. This survey undertook to map existing legal technologies and areas where they are utilized in the US and Europe.

Of the 322 top legal technology tools, 51% were being adopted for criminal use, while an average of 22% were being adopted for utilization in civil cases, ranging from health, real estate, housing, to family law.

2.5 Current artificial intelligence applications in the legal sector

King & Forder (2016), suggests there is an increasing interest by legal practitioners in computational information systems. Such systems include predictive tools that enable users to extort and regain relevant textual data out of huge volume-noisy data using predictive searching by search engines. King & Forder (2016) further puts it that artificial intelligence is expected to interrupt and assists the customer's understanding, implementation and management of the organization's infrastructure and legal processes. Mike (2017) posits that artificial intelligence is able and more proficient in doing analytical tasks as well as reproducing the majority of the work which is being performed by humans. Of importance is the ability to manipulate tacit legal knowledge which helps in decision making by lawyers and their customers. These systems operate as legal warehouses, learning and building up from their own understanding and comprehension to improve the advice offered to clients.

Mike (2017) suggests that artificial intelligence is challenging human expertise contributions in legal services by way of legal data research, e-discovery, intelligent interfaces, predictive technology, triage services, and other legal learning algorithms. Legal research data in most cases comprises predictive systems through which artificial intelligence can foretell the outcome of a case based on a certain theme, precedence (previous case outcome), judge perception and inclination; for example, if they are well known to pass feminist judgments, or if their inclination is towards suppression, repression, against certain rights as well as learning from the multiple decisions a certain court or judge will have decided on a category of cases.

Table 2: Existing artificial intelligence legal applications

Legal artificial intelligence field	**Capacity utilisation**	**Existing tech companies**
Due Diligence	Provides background information for Advises clients on existing legal options	Kira Systems, Leverton, eBrevia, Ross intelligence, JP Morgan, Thought River, Law Geex, Judicata, Legal Robot, Casetext's CARA.
Prediction Technology	Predict the outcome of litigation and cases. Useful for case monitoring.	Everlaw, DISCO, Catalyst, Exterrro, Brainspace discovery, Intraspexion, Premonition.
Legal Analytics	previous case win/ loss analysis, precedent judge decision matrix analysis, creates data points and reasoning logic for judicial oversights. Can be utilized for prediction of cases.	Lex Machina, Ravel Law
Document Automation	Draft contract, wills and other documents. Automated discovery, develop legal templates for data input.	The report, Perfect NDA, Discover, Ross intelligence
Intellectual Property	Searches large databases of IP material for similarities and performs context assimilations.	Trademark Now, ANAQUA Studio, Smart Shell
Electronic Billing	Performing electronic billing on legal time	Bright flag, Smokeball

Source: Dabass (2018[8])

Vedder & Naudts (2017), states that in the current global legal tech world, predictive systems are mostly utilized in pre-litigation processes such as contract drafting, legal research, and potential searches. Such artificial intelligence-driven software inspects large volumes of publicly accessible court records and documents, previous cases and decisions reached up to the current date. They automatically locate and file code for future record searches. Furthermore, predictive artificial intelligence system analyses and collates data including costs awarded on a case, the extent and amount of damage claimed/awarded, cases that are settled by top companies per year, commentary by scholars, a perception on certain judgments. For example, Lex Machina is useful in timing analytic features and artificial intelligence to

[8] The scope of Artificial Intelligence in Law. It should be noted that the list is endless as there are many platforms and software's being developed over time.

anticipate and predict the amount of time and effort a certain case takes or is likely to take before a specific court or judge.

2.6 Document review, legal text classification, and legal research

According to Donahue (2018), artificial intelligence resources present bigger opportunities for law firms with regards to review, classification, and legal research. This is so, as artificial intelligence software can review and flag documents as relevant to a case and present case outcome using such documents. Here once a type of document is denoted as relevant, deployed machine learning algorithms can work to find other documents that have a similar relevance pattern. Similarly, insofar as artificial intelligence algorithms act faster than humans in providing alternatives they are thereby able to increase the rate at which cases are completed. It also reduces human workload by only presenting such documents that are relevant to an inquiry, thus limiting the amount of time taken on research. Take as an example those artificial intelligence systems that are offered by Ross Intelligence, which leverages natural language processing to help document analysis (Ross, 2017[9]).

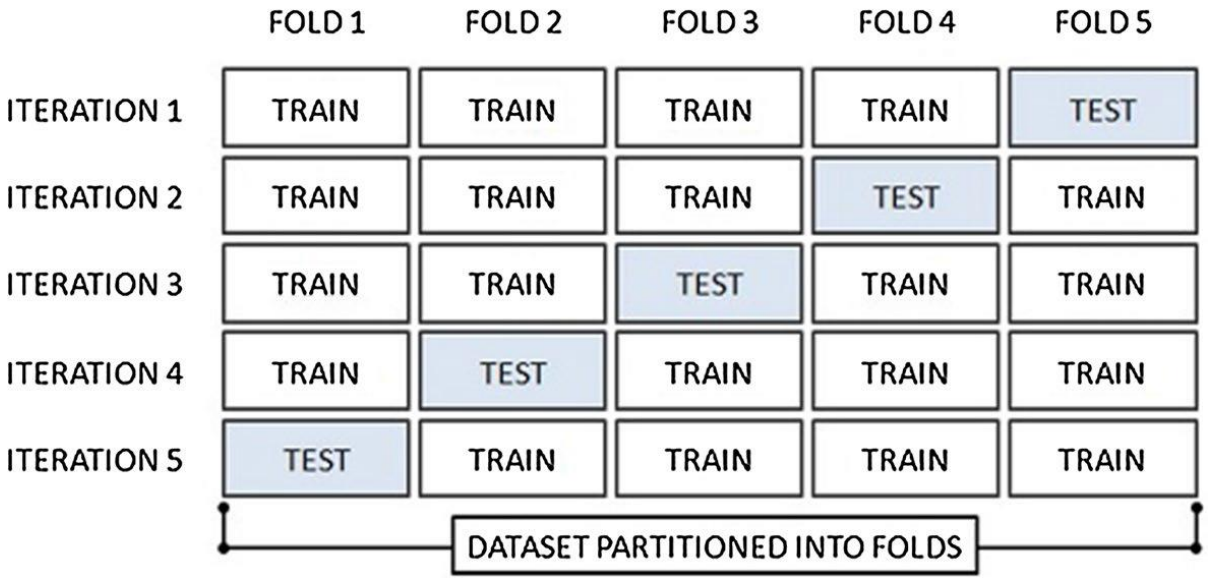
Ross Intelligence software is a tool powered by natural language processing and Legal Cortex, which enables the user to pose full sentences as questions to the system and the system generates legal research based on its comprehension of the question (Ambrogi 2017). Additionally, the system drafts legal memos based on the research it finds with further commands such as "*[w}rite me a memo]"* which are put in front of a legal search. Currently and globally, Ross Intelligence is being utilized for filing bankruptcy, intellectual property cases, labour and employment research, while the organization is considering applications for use in tax law, securities and family law (Beck and Ashley, 2017)

eBrevia utilizes legal text classification algorithms to use in a program that can analyse cases based on judgments that are placed on a certain website like SafLIi and is able to predict if certain provisions of the law were overlooked or violated in any of the cases. However, such machine learning algorithms have not been often utilized in the legal field. The data collected is utilized for legal classification using automatic text classification methodologies, where a very large amount of structured and semi-structured data from cases is split into facts, arguments, decisions, and reasons for decisions, which are then fed into the machine learning

9 Lawyers of tomorrow Podcast, Ross Intelligence: AI in the Legal Profession, AI and Legal Research (Presentation by Stephen Turner.)

program in order to predict decisions and possibilities of outcomes in the future. They further utilize the Support Vector Machine (SVM) linear classifier which sorts data based on labels provided in a certain dataset and establishes the generic and simplest methodology which separates different data points from the data set to help reduce the amount of error. The algorithm deciphers and decides the most suitable hyperplane (a line in multiple dimensions of data) to split the data into segments that are easy to decipher and derive meanings and conclusions. Each dimension of data is analysed for its own independent and interrelated meanings to the main category of data.

Figure 8 Example of fivefold cross-validation in SVM



Source: Bay (2014)

The objective of the SVM is to decide on the position of the hyperplane in a way that ensures the largest possible margin is reached, allowing for a better possibility of codifying the data more accurately. A separate set of case law data is used to evaluate the performance looking at the percentage of correctly predicted cases

2.7 The contribution of artificial intelligence in improving legal due diligence processes.

Further according to Donahue (2018), artificial intelligence can assist law firms to improve on due diligence by uncovering background information on behalf of their clients which ordinary

would be difficult or impossible to uncover. This includes confirming facts and figures as well as evaluating decisions on prior cases for effective advice to clients.

Artificial intelligence has been greatly used in the performance of due diligence work, mostly to uncover background information such as precedence, privilege, and *lis alibi pendens* (to discover a case that is pending somewhere or in another court within the same jurisdiction.) One of the most important tasks done by lawyers is performing due diligence in a case on behalf of their clients, this is a duty in line with the legal ethical principle of legal integrity. Lawyers are expected after completing due diligence to advise clients responsibly on what their options are, and the actions the best course of action.

A study by the City University of London (2016) concluded that thorough and extensive due diligence processes by lawyers have a positive long term impact on the profitability of legal firms. However, the same study concluded that it is sometimes a very time-intensive and labour consuming process, where in some cases it does not give meaningful results and even abound in errors made by lawyers.

A case study was made on the Kira Systems[10] program which perform due diligence. The motivation for the employment of the Kira systems was that the frequent due diligence errors made by junior lawyers often affected the success rate of the law firms and resulted in them losing large sums of money, as well as an increase in labour and time spent on cases, lawyers often working overnights or weekends[11]. According to Bay 2014[12]:

"…Many associates are in a certain negative mood about the efficacy of manual due diligence. Lawyers, being human, get tired and cranky, with unfortunate implications for voluminous due diligence in M&A…"

The Kira Systems is built so that it can perform a more specific and accurate due diligence process for the reviewing of contracts through the action of searching, extracting and highlighting relevant and most plausible content for further analysis, (Bay 2014), It uses machine learning capabilities to link search and originated patterns to the main documents and has proven to have a 40% quicker rate compared to the manual ways of doing the same work.

Another due diligence tool that has been developed is the eBrevia platform. The reasoning behind this platform is that sometimes lawyers have a burden of reviewing large and multiple

10 https://kirasystems.com/how-it-works/
11 https://kirasystems.com/resources/case-studies/integreon/
12 https://law.stanford.edu/2016/03/08/deloitte-kira-systems-alliance-re-ai/

contracts to the extent that they miss certain important aspects of a contract which often raises new legal issues in the future. eBrevia is designed to shorten and reduce the document review process using natural language processing and machine learning in order to extract the most relevant textual data from retrieved contracts and bring it to the attention of lawyers guiding them in analysis, developing abstracts, and performing their due diligence work (Abramowitz, 2018). However, the attorney would have to decide the type of information that needs to be extracted until such time the machine can learn how to sift information required for a particular legal text. Any information having been extracted is then put into a report which can be shared later in various versions.

According to Forbes (2015), one of the advantages of eBrevia is that it can scan and process multiple documents for example 50 documents in one go and is considered 10% more accurate than manual searches and 95% faster than manual searches; and as a result in the long run is likely to save the firm the labour of three researchers and 25% of research costs.

With regard to due diligence, another top artificial intelligence company is LawGeex[13]. The software validates contacts if they are drafted within certain parameters conforming to predetermined policies, and when they fail to meet the necessary standards, alternate suggestions can be made for adoption and approval by the attorney. The crux and operation of this software is combing through data by means of machine learning, text analytics, statistical derivations, and tacit knowledge by legal practitioners, in the form of pre-drafted documents to come up with and suggest certain conclusions. According to the Whitehouse OSTP (2016), the companies using artificial intelligence tools are cutting research and contracts drafting costs by 90% and increasing contract approval and signing time by 80%.

Ross Intelligence is one of the upcoming legal tech companies applying artificial intelligence in making diligent searches. The programseeks to reduce the amount of time that lawyers take to perform due diligence and contract drafting processes. It uses natural language search capabilities by asking questions and getting directions, receiving information related to precedence, and repeated case law.

According to Bakerhostler (2017) [14], Ross Intelligence can search a great number of documents in its servers and on the internet before providing its suggestion, once the level of accuracy is very high. Part of Ross's learning process involves permitting the users to use an up voting and

13 https://www.lawgeex.com/resources/aivslawyer
14 Meet Ross, Your Brand New Artificially Intelligent Lawyer, https://youtu.be/ZF0J_Q0AK0E

down voting function, enabling it over time to generate extracts based on deep learning to interpret questions. Another notable feature is every time Ross answers a question, it asks for feedback on its performance through which it learns, adapts, and improves itself. Ross intelligence is poised to save lawyers up to 30% of their time, which coincidentally relates to how much time lawyers spend on legal research[15].

2.8 Applying artificial intelligence in contract review and management

A significant contribution in terms of artificial intelligence and the law has been in the aspects of contract drafting, review, and management. Law firms survive most of the time on analysing and drafting contracts for their clients and advising clients to sign or amend such contracts. Companies that have created artificial intelligence tools for contracts include Kira Systems, LawGeex, and eBrevia. Such systems sort and modify contracts and have fewer errors than humans.

Natural language processing has been effectively used in contract reviews as it is considered faster at reading contracts compared to human lawyers. If combined with natural Image processing, it can comprehensively read contracts that include images. In Matlab and Smartshell, natural language processing has been utilized to provide drafting, identify patent considerations, review, and format documents. Additionally, in Lex Machina's Legal Analytics, natural language processing has been able to provide information of the applicant (Plaintiff), their attorney as well as the defendant to predict the likelihood of winning or losing a case based on an analysis contracts (Forbes, 2015.)

2.9 Artificial intelligence and its use in legal predictions

According to Donahue (2018), artificial intelligence has the potential and capacity to analyse data, including big data, to help come up with predictions on the outcomes of legal cases that are better than humans. It is always essential for lawyers to be able to assess the likely case outcome for their clients. With case prediction algorithms, artificial intelligence has the potential to improve suggestions and case investment decisions for lawyers. These include making decisions like settling or going to court, the amount of time to be taken on a case, the

15 Meet Ross, the newly hired legal robot, Washington post (May 16, 2016). In most cases legal work is deeply embedded in research. Reducing the amount of time, a lawyer undertakes legal research will ultimately reduce the amount of time each case is handled.

total possible cost to be incurred if case runs to its end, and whether a client should proceed with a case.

When it comes to legal work, particularly document discovery and privilege classification, it is essential to look at artificial intelligence tools in terms of their ability to predict legal outcomes (Rose and Semmler, 2018). This is because all the documents and data generated are supposed to be correlated to the output given in most cases, machine learning programs are automated to have a certain threshold of outcome predictions to check if the classifications of discoveries made are the most probable to bring an outcome to a particular case (Beck, 2016).

One such case is the test made in 2004 by a group of professors at Washington University, who tested the proficiency and accuracy of a developed algorithm on all 682 decisions made by the American Supreme Court in 2002. The statistical model developed by the algorithm predicted 75% more accurately to the likely outcomes or the reasoning made by the court, suggesting that predictive technologies can be important in resolving the world's legal problems (Rose and Semmler, 2018). In 2017, Aletras developed a machine-learning algorithm to analyse case text of the European Court of Human Rights and achieved 79% accuracy on its ability to predict outcomes. According to Kartz (2013), quantitative legal prediction plays a very important role in certain legal practice areas with the role likely to gain momentum as access to legal data and information become increasingly available in the knowledge economy.

The argument that predictive technologies can aid in resolving legal problems is however rebutted by Solove (2014), who opines that in legal work one case lost by predictive errors, say in discovery, can have a huge bearing as it might be used as precedent for the many other similar cases, thus affecting the objective of achieving justice.

One notable tool which has been developed for legal prediction is RaveLaw. The tool can search outcomes based on relevant precedence, case law, and referenced cases in more than 400 jurisdictions. It further has a judge's dashboard which has cases, previous and current citations, and decisions of a specific judge in each jurisdiction. This is supposed to aid lawyers in understanding the legal reasoning process of a judge and predict the potential outcome of a case.

According to Dixon (2018) Lex Machina's Legal Analytics platform can assist lawyers in developing legal strategy, using certain timing analytics features, which estimates the time likely to be taken on a case if it is taken before a specific judge, based on previous case analysis. The platform has a Party Group Editor (PGE) which also allows potential clients to select

certain lawyers and analyse their experience before a certain court or judge, the number of cases they were involved in, which of them was taken before any particular court or judge, the results they have achieved in each case, and the potential results based on such a predictive analysis.

Lastly, another artificial intelligence tool, Premonition, which has the world's largest legal database, invented the concept of the predictive outcome by developing an algorithm which predicts a lawyer's success by analysing his previous success rate, the average duration of cases, the normal cases he wins, and pairs that with a judge, developing an accuracy level of 30% (Rose and Semmler, 2018).

According to Karts (2018), artificial intelligence platforms which deal with predictive technology requires a lot of data in the form precedence and case documents to functionally work because this model is considered highly complex as it needs at least 95 variables (with precise values of up to 4 decimals) and supported by at least 4000 randomly picked decision trees to predict a likelihood. This points to the intensity of the algorithm in breaking down information and variables in order to come up with a good prediction and effectively suggests a better decision to the lawyer. In such scenarios each decision tree will lead to its own recommended outcomes which are then compared against the other variables to come up with the most common variable which is then considered as the more likely prediction.

2.10 Artificial intelligence and e-discovery

Electronic discovery has changed how cases are dealt with in legal practice. According to Palmer (2018), over the past 15 years, electronic discovery software has attempted to resolve some of the fundamental issues giving rise to problems for lawyers. For lawyers the issues are mainly concerning those of legal costs, which are high, and of time, that it takes too long to get all the facts of a case. Regardless of the efficiencies brought by e-discovery, the huge amount of data and the excessive costs of document review have made the development of cheaper, more effective and faster e-discovery a holy grail for lawyers and their legal teams. (Smith 2018).

Artificial intelligence already plays an existing role in terms of document discovery; however, such a role has not been sufficiently extended to include legal documents. Much of the data

analysis for document classifications have been from documents which form part of the existing body of electronically-stored information

In the practice of civil procedure in an inquisitorial adversarial system, as a general rule, a party is entitled to be informed of all the documentary evidence to be used in a trial (this includes all graphical, digital, and electronic recordings). The rules of the court usually require the party to deposit an affidavit in which they set out in chronologic order all the documents to be discovered. For example, in South Africa Rule 35(13) of the High Court Rules and Rule 23(14) of the Magistrate's Court Rules provides that provisions for the discovery of documents apply to each party mutatis mutandis (in similar nature). Discovery of documents thus forms a critical process of the civil practice, which cannot be ignored as it is provided for by law to be present in every legal jurisdiction so that the opposing parties in a case have fair access to evidence being brought before the courts. Many documents and large volumes of information are transferred and exchanged at this stage.

In the American case of Zubulake v UBS Warburg Llc, Judge Scheindlin provided guidelines for easy adoption, or e-discovery, including the usual difficulties in assembling the requisite documentation. In the judgment, Judge Scheindlin bemoaned the skyrocketing legal costs suggesting that courts should engage in cost-shifting analysis when making judgments if data is provided through e-discovery stages. She, however, suggested that e-discovery should ensure that positive action be taken to monitor regularity and compliance: to the extent that all sources of information to be discovered are searched and are identifiable. The influence of the Zubulake decision resulted in the amendment of the American Federal Rules of civil procedure in December 2006 which provided for E-Discovery. The rules then allow reasonably accessible, electronically stored data as discoverable by presumptive notice though it requires parties to show good cause for complex data, especially in intellectual property cases involving big data firm companies such as Google or Microsoft. Regardless of such provision in the law, the discovery of documents remains largely based on professional discretion, and cases, where discovery is abused, continue to be noticed. This provides opportunities for automating completely the discovery process.

Document discovery in legal work forms an essential part of a case in that, it is at this stage that decisions on the type of evidence that exist and how such evidence is to be led in court are made. At this stage, large volumes of data can be presented and need to be analysed for issues of privilege, self-incrimination, and other legal issues. Thus, applying artificial intelligence at

this stage eases the process, reduces the amount of time spent on these administrative steps and optimizes the classification process.

In one of the models offered by Dancine (2018), the e-discovery process follows three phases which they present as follows:

- Identification of the producible document set with predictive analysis;
- Identification of privileged content in the producible set with predictive text analysis; and
- Confirmation of the limited privileged distribution of the documents - utilizing attorney review and metadata analysis, as well as the use of sampling to test the no privileged produced documents to avoid inadvertent inclusion of privileged documents.

Artificial intelligence can play a key role in automating the e-discovery process. Within the framework of e-discovery, there needs to be many deepening integrations that enhance visibility into data sources even before collection. Artificial intelligence can thus leverage on this in early case assessment and apply data mining techniques to the large volumes of data provided at this stage and develops maps, for identities and relationships within the data provided. Such relationships can be examined in order to extract key concepts for legal reasoning and argumentation. Artificial intelligence machine learning techniques can thus suggest primary words and define search criteria relevant to the case. According to Palmer (2018), the ability of machine learning algorithms to narrow down the focus of a legal case and major on the main concepts and arguments can narrow down large volumes of data into more specific elements and increase legal efficiency in e-discovery.

Palmer (2018), believes that artificial intelligence can aid electronic discovery by means of a simulation of key functions pertinent to the process: as an advisor, as a curator, and furthermore as an orchestrator. For this, machine learning can suggest documents for deeper review in the same way Netflix recommends a new television series to its users or YouTube suggests new videos. Further, it can advise an attorney on the scoping, or collection criteria, for case material. As an orchestrator, machine learning algorithms can review the entire electronic discovery process to learn from the past decisions, searches, narratives, and actions taken effectively to suggest a better modus operandi for any future cases, as well as to coordinate actions across the multiple channels for legal reasoning.

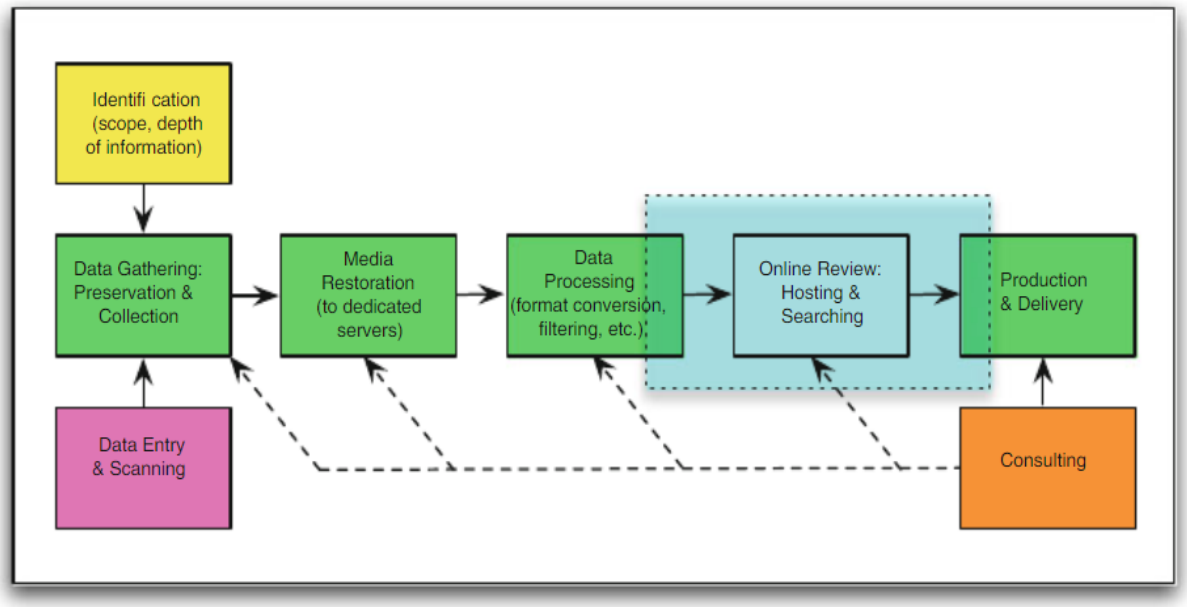
Ismail (2018) further contends that the use of artificial intelligence and machine learning algorithms improves the speed and accuracy of identifying privileged information, using tools like statistical sampling and advanced text analysis, which use metadata and rule-based classification models. To reduce the rate of human error at this stage other e-discovery processes are basing on algorithms which include, advanced analytics, and multiple reviews passes to minimize the risk of disclosure of privileged information at the discovery stage.

It is in this regard that predictive coding has also been adopted and offers many benefits that increase consistency in the classification process and reduces indecent disclosure. This includes the use of the 2010 legal track, the interactive task which was introduced to test whether participants can identify documents that are subject to a claim of privilege, attorney work product, or any other applicable modes of protection, regardless of how responsive they are.

Regardless of such an amount of work having already been done and further interventions being put in place to improve this aspect of legal work, it is notable that a large gap still exists on how document discovery and privilege classification can be automated.

Smith, (2019), suggests a model by which automation of discovery processes can happen. The initial steps of moving from paper-based discovery have already been made. Smith (2019), further agrees with Palmer (2018), on the fact that automation of discovery has to be based on early case assessment which includes identification, the definition of scope, and estimating the depth of the data needed before such data is gathered, harmonized and utilized. Fig 9 provides the framework through discovery can be automated according to Smith;

Fig 9: The e-discovery process- multistage workflow



Source: *Smith 2019*

Furthermore, according to Smith, there is a great deal of artificial intelligence software that already exists that can help to process data, once it has been well identified and properly defined. Machine learning can help in this sorting and labelling process by learning from the previous data set taken from the in-house database or through searching the web to determine the key categories of data it needs.

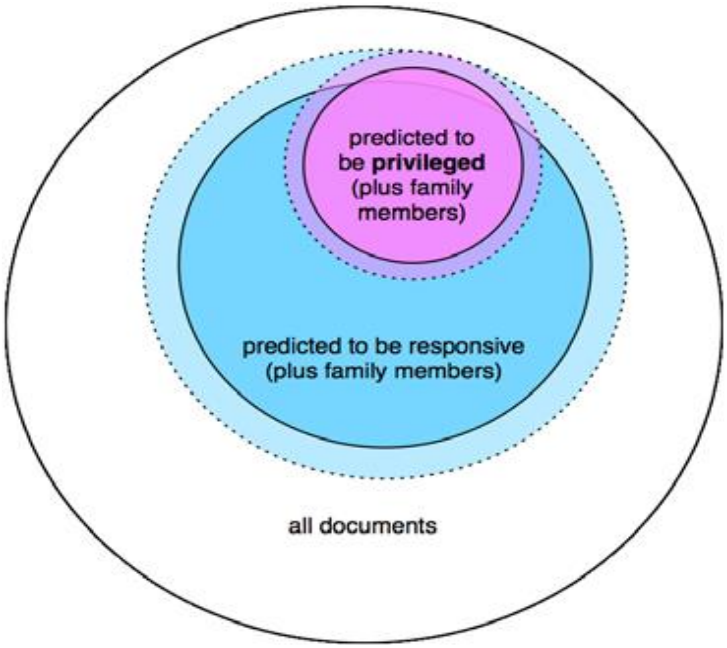
Privilege classification/ review and discovery

Manfred et al. (2018) posit that privilege review/ classification is combined and form a key aspect of the discovery of documents. Issues of privilege can only be unearthed and dealt with in a discovery process, and as Manfred puts it, the stakes are generally high. This is because the privilege review is generally the most expensive part of the documents review. It thus means that successful automation of the discovery process through machine learning algorithms and advanced text analytics will reduce by about 70% the volume of documents reviewed by lawyers (Rand Institute for Civil Justice ,2012).

The cost scale margin of the discovery of documents and privilege review is generally born by the client in most cases as it is difficult to filter relevant and case suited documents from the ESI. Manfred et al. suggest that performing privilege classification in discovery follows three main phases that need to be automated.

- Identifying documents that are compatible with predictive analysis relevant to the case;
- Deduction and identifying privileged content within the documents using predictive text analysis;
- Confirming the limited privileged disaggregation of the data using metadata analytics and sampling to measure and test the documents which do not contain privileged information to exclude them from inclusion as privileged data.

Figure 10: Phases of privilege classification



Source: Manfred et al. (2018)

Manfred et al. further argue that the use of artificial intelligence machine learning algorithms in such processes will improve the speed and accuracy of deducing privilege information, through computational sampling and advanced text analysis based on deep learning and rule-based classifications.

One artificial intelligence algorithm utilized in privileged classification is Porfiau. This is a form of machine learning algorithm with a form of statistical pattern recognition. Porfiau works by deploying proprietary algorithms with FSMs (Finite static machines) to produce methodological characteristics that permit the sifting of un-coded and unusual text characteristics. It does so by searching representative patterns existing in all documents character-wise, including all alphanumerical and special characters. Once this is done, the signal on non-privileged data is sent to suppress it. Additionally, Porfiau classifies all new data and text in sequence, considering each individual character and recognizing any individual

signal that predicts privileged use automated text classification. It then defines a privileged document selected as a document containing one or more privileged text units (Manfred et al. 2018).

Results of the test conducted by KPMG suggests that the artificial intelligence tool, as like others, are more likely to predict better results in discovery when compared to human lawyers.

Fig 11: Efficiency measurement in e-discovery

Lawyer / Manual Review
(pre-adjustment)

	Coded Privileged	Coded Non Privileged	
Privileged (LR)	239	255	
Non Privileged (LR)	369	874	
			1,737

Recall	48%
Precision	39%
F_1	43%

Lawyer / Manual Review
(post-adjustment)

	Coded Privileged	Coded Non Privileged	
Privileged (LR)	239	170	
Non Privileged (LR)	369	874	
			1,652

Recall	58%
Precision	39%
F_1	47%

Porfiau
(pre-adjustment)

	Coded Privileged	Coded Non Privileged	
Privileged (LR)	444	50	
Non Privileged (LR)	616	627	
			1,737

Recall	90%
Precision	42%
F_1	57%

Porfiau
(post-adjustment)

	Coded Privileged	Coded Non Privileged	
Privileged (LR)	370	39	
Non Privileged (LR)	616	627	
			1,652

Recall	90%
Precision	38%
F_1	53%

Source: Manfred et al. (2018)

Using the same data, the Machine learning algorithm was able to predict more accurately than a human being and had a 90% recall rate compared to a human recall rate of 48%. Additionally, the amount of data or documents that can be analysed at the same time is significantly higher and would take days for an attorney to complete it. The effectiveness of the artificial intelligence algorithm suggests that if it is automated and held to a suitable standard, then it can help reduce legal costs and improve legal service delivery.

2.11 Artificial intelligence's role in legal research and case law management

Artificial intelligence and its tools have been gradually integrated into the management and use of case law. According to Madhuku (2006), case law generally refers to the body of knowledge where cases decided by judges are put out as written judgements. In such cases, they form

precedence, which is that previously decided cases by the superior courts of law (the High Court, Supreme Court, and the Constitutional Court) have standing in another court as long as the reasoning is the same.

Judges are required in most jurisdictions to write judgements for all cases which they deal with. This is known as the record. In most jurisdictions, their editorial bodies tasked with deciding the most prominent cases which set precedence. This precedence is legally binding on all courts of the same level or below unless there is another law that expressly overrides it, and this in most cases is an Act of Parliament or the Constitution.

A growing body of literature exists in the analysis of both quantitative and qualitative case law in many jurisdictions. One common example is that Behn and Langford (2017) collected manually and coded 800 case law on investment treaties and arbitration for use by Judges in European Courts. Tarissan (2014) applied quantitative methods in analysing case law on the international criminal court and the court of the European Union. However, in most of the case law codifications going on, there is still manual collection and hand-coding, leaving a huge role for artificial intelligence to play in coding and harvesting case law through machine learning algorithms.

Nevertheless, there has been considerable effort to use computerized techniques to collect case law and generate automatically usable information. Dyvre (2015) makes a discussion about the use of automated content analysis in the law sector implementing tools such as Wordscore and WordFish[16]. Originally these tools were used to extract political positions using text and word frequencies in documents. He applied the two techniques to analyse judgement of the German Federal Court of European Integration and found out that both of these software tools could mine judicial precedence estimates which were highly reliable when compared to accounts appearing in legal writings.

Accordingly, Christensen et al. (2016), implemented a network analysis that automatically identified cases of commercial violations. They utilized the network structures based on citations to infer automatically the contents of a court record or judgement. Similarly, Panagis et al. (2016) utilized topic modelling techniques that automatically deduced hidden or obiter topics in judgments of the Court of Justice for the European Court. This was similarly done by Lindholm (2017), who utilized computer-generated scripts to extract and mine data concerning

16 https://howdo.com/department-best-practice/legal/artificial-intelligence-law-legal-department/.

citations in the Court of European Justice for the European court. In addition, many studies have presented descriptive statistics of manually coded case law (for example Bruinsma and De Blois 1997; White and Boussiakou 2009[17]) while some scholars such as Dhami and Bhelton, 2016) have utilized machine learning algorithms to present more sophisticated results using regression analysis and predictive modelling.

2.12 Role of artificial intelligence in legal analytics

Machine learning plays an important role in a creating data set from past cases and history of judgements to define trends and patterns for a particular legal need. In e-discovery legal analytics can help define search criteria and search for documents that are acceptable in a whatever case jurisdiction is necessary to help in the discovery process. According to Lee et al. (2016) case documents can help in proving summaries and in providing supplementary insights for litigation by lawyers by being able to extract key data from relevant documents to support arguments. For example, Lex Machina's Legal Analytics tool can help find out who is the plaintiff and who is the defendant and in such a case help to define criteria for discovery and privilege classification. In addition to that it establishes within the search criteria, previous cases by the defendant of the plaintiff, discover whether there are trends similar or not, which may help in deciding a certain action to be taken in the litigation. This generates data utilized in analysing opposing cases, improving the likelihood of success.

Another similar example: Settlement Analytics[18] creates its analytics after filtering cognitive trends and biases and then develops interpretations at a random level by using data science procedures.

2.13 Automation of documentation

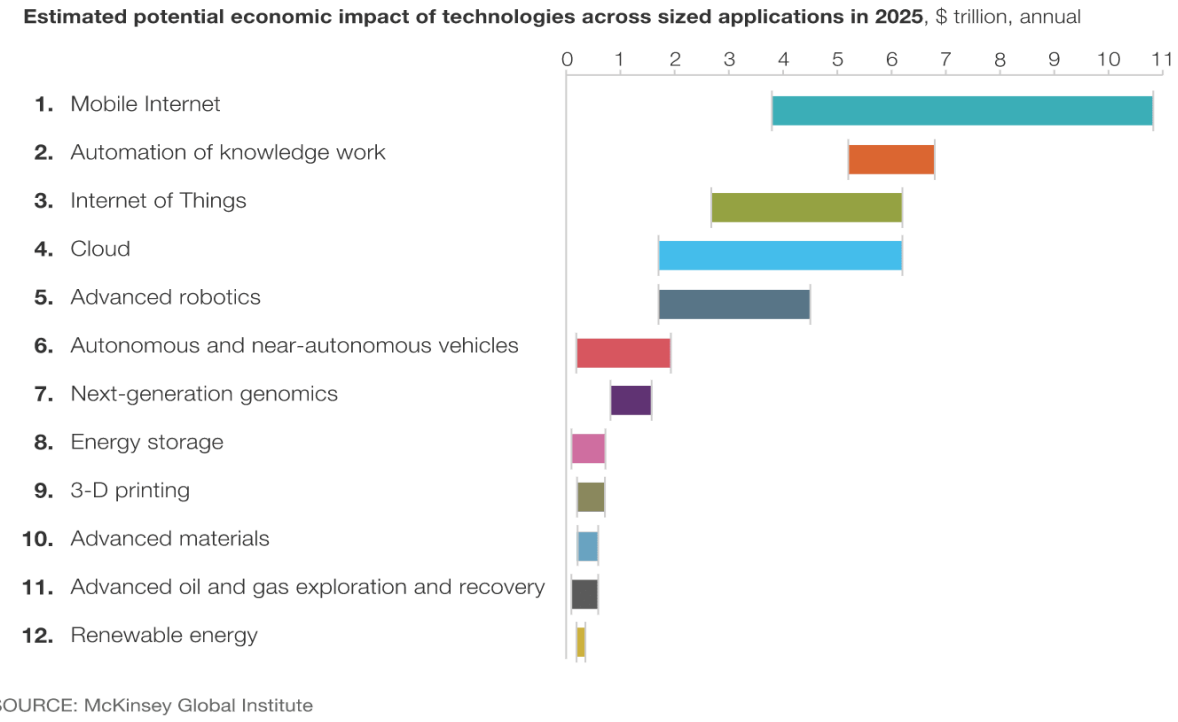
According to a McKinsey and Company report[19], the automation of knowledge work is regarded as one of the top disruptors in the global economy by 2020. The use of disruptive technology is likely to have an effect on most professions, especially those with a dependency on knowledge generation such as law, engineering, and accounting.

[17] Quoted in Lee et al. 2016.

18 International Seminar on Big Data "Building Pathways for Policy-Making with Big Data" Bali, 26 July 2018.

19 Artificial Intelligence, The Next digital Frontier, https://www.mckinsey.com/~/media/McKinsey/Industries/Advance Electronics/ Insights on How Artificial Intelligence can deliver real value to companies-MGI-Artificial-Intelligence-Discussion-paper.ashx.

Fig 13: Impact of technology on business



Accordingly, some legal companies have started adapting to this disruptive technology by making use of document drafting software such as Diligence. Such software has the potential to reduce the amount of time required for working on a specific document, like a contract. Common features of such software include document filing and electronic signatures, which are used to streamline the manual process in document drafting.

One such tool is Smartshell[20] which supports paralegals, who are involved in document reviews, drafting, and contracting, to identify issues for contractual purposes. Smartshell uses artificial intelligence and natural language processing to assist in drafting legal claims.

2.14 Risks and challenges associated with artificial intelligence

Despite the potential of artificial intelligence to transform the legal profession, there are several risks that come with its utilisation. One such has been raised by the European Commission Consumer Consultative Group (2018), which related to data protection and privacy. The commission noted that there has been a concern that training artificial intelligence algorithm entails the use of personal data for use as input or output of the algorithm. There is thus no guarantee that the large amounts of data utilized to train the algorithm are not biased against certain groups or populations. Further, there is no guarantee that recommendations made

[20] https://www.information-age.com/ai-in-the-legal-industry-2-123474118.

especially on discovery will neglect one part against the other considering the development of the legal system has been in some countries based upon gender, ethnicity, race, and age.

According to the Norwegian Data Protection Authority, in its report on artificial intelligence and privacy; the fairness principle requires that all handling and processing of personal information should be done with utter consideration to the subject's interests, and the data should only be utilized in accordance with what the originator of the data might reasonably expect. It further notes that the person controlling the data should, by all means, implement measures that prevent discriminatory treatment on individual persons or which lead to discrimination.

The potential thus for data manipulation has led to call for more transparent and accountable data management systems across law firms (Remus, 2017). This is done to ensure that data becomes visibly managed and there is no potential for hidden manipulations. The basis for effective artificial intelligence is the protection of the data and the guarantee that it will only be utilized for the intended purpose (Palmer 2018). Additionally, as propounded by Stuart (2016), the foreseeable liability and potential prejudice that comes with the manipulation of artificial intelligence systems might affect how artificial intelligence is adopted in the legal sector.

2.15 The role of artificial intelligence in aiding judicial interpretation and decision making

While it is important to look at the applicability of artificial intelligence algorithms in supporting legal work done by lawyers and speeding service delivery by lawyers, it is also important to look at how artificial intelligence is useful to judges and magistrates in reaching their decisions and in interpreting the law. With justice delivery there is always a complimentary role between lawyers and judicial officers, in most cases they cannot operate in isolation. While lawyers can practice without necessarily taking cases to court (for example using mediation, arbitration and enforcing out of court settlements), judges are reliant on lawyers for them to effectively deliver on their work. In certain types of cases and depending on jurisdiction, judges will not allow certain cases to go to court without proper legal representation. For example, first degree crimes like murder and treason have to be accompanied by a lawyer, either appointed by the State or at the prerogative of the client. In Zimbabwe and South Africa, civil cases going to the Supreme Court or some High Courts are

required to have legal representation to ensure a fair trial. In such cases the intricate relationship between lawyers and judges is very evident. Lawyers are in most jurisdictions considered part of the contingent of the officers of the courts, and the ethics required of them, expect them to diligently and honestly serve the courts and reduce the amount of workload for the courts by simplifying cases, bring proper evidence for the courts to deal with and to expedite their cases in reasonable time (Crozier, 2017). Artificial intelligence is thus a converging point for lightening the burden on the courts in those cases where legal issues are brought before court and require judicial interpretation.

Judicial interpretation is a very important aspect of the litigation process. It has often been said that the misinterpretation of the law by judicial officers often leads to injustice the same way that negligence by lawyers can. It is thus in this context that the consideration of artificial intelligence can play an important and supplementary role in aiding judges and magistrates in the performance of their work. In this regard, importance has always been placed on the *ratio decidendi* and *obiter dictum*. That is how does artificial intelligence help judges develop their judicial argument and reach a decision in the process. In particular is the process of how judges can utilize artificial intelligence to develop their *orbiter dictum* and formulate their jurisprudential point which in turn influences the reason for each decision made per each case.

According to Buocz (2018), the emergence of artificial intelligence has changed many aspects of the judicial process, this is more specifically in the skill set that is required by the judicial officers (Judges and Magistrates). In this context, judges are required more and more to improve their computer application skills. Buocz presents three scenarios by which he suggests that artificial intelligence will assist the judicial officers in making their decisions.

In America, technology-related judicial reviews are starting to receive judicial recognition and approval (Dalke, 2013). For example, according to Liptak (2017) in 2017, the Supreme Court Justice of the United States was asked if he foresees a time when artificial intelligence would assist judges and the courts with fact-finding and judicial decision making, his response was, “it’s a day that’s here already and is putting a significant strain on how the judiciary goes about things”. A study conducted by Danzigera (2011), found out that judges were more likely to accept prisoners' requests for parole at the beginning of the court session than at the end of it. It further opined that a prisoner’s chances of getting parole would increase if the case is heard in the first session, rather than any later session of the day. Statistically, the study showed that 65% of parole hearings conducted in the first court session of the day, and during the first hours

was favourable to the prisoners when compared to any other sessions. Armed with such a statistical and foreseeable inference, it is thus to be supposed that artificial intelligence may help in legal predictions and further assist judges in making fair and uniform assessments of the law.

In this regard, it is also argued that the adoption and utilization of artificial intelligence in judicial decision making will help to reduce the influence of factors such as bias, weariness, emotional connection to cases. The influence of artificial intelligence resources in judicial decision making may very well reveal the various divergent human-constructed structural biases that are embedded in the legal system itself (Flores, 2016). However, the danger exists that the artificial intelligence software itself could be manipulated to support whatever biases may exist within the legal system; for example, as in the case of the Alternative Sanctions software used for profiling by correctional service offender management, that was being used in the USA and Canada for predicting the likelihood of the defendants committing again in the future a similar offense as that for which they were convicted. It was found that the software was racially biased against black and African American offenders (Angwin, 2016).

According to Hanson (2016), current technology is not yet ready to produce an artificial intelligence algorithm with broad-based capability to perform the work of a judge. However, it could be adequate at this point to support the judge in reaching effective judicial decisions. Hanson suggests that this is not because of the complexity of the tasks at hand but mainly because of the interactional and triangular tasks of judicial work, which is given as perception based, emotionally attached, and legally connected. A good judge is expected to have critical skills in legal drafting, research, language, creative problem solving, logical connection, and a broad set of social skills (Feltoe, 2006). According to Balkin (2015), artificial intelligence applications take on particular aspects and capacities of persons, in this case, they operate as special-purpose humans. this generally implies that they are agents for a particular reason or function and thus straddle between the lines of selves and tools; or persons and instruments. Balkin further argues that this is the reason why the process of effective utilization of artificial intelligence in judicial decision making will be gradual and slow which has to start with parallel existence (concurrent use).

Balkin (2015) believes that there is a danger of judicial relinquishment in the use of artificial intelligence to assist judicial decision making. This is primarily because of the use of bias and structured connections that likely include judicial offices in making decisions that are inclined

towards a certain element. This is also considered as co-robotics. The emphasis of co-robotics is in facilitating the functioning and communication between humans and machines, it is thus important to ensure that artificial intelligence is only there to support the work of judges and not take up their role in essence. This will ensure that the final *ratio decidendi* is evidence of judicial thinking and not machine oriented cognitive thinking. If this is not properly constructed and ensured, it will result in reduced confidence in the use of the judicial system.

In 2011, Judge Beck of the United States Supreme Court published in a bar journal an article in which he recommended the adoption of predictive coding in the judge's chambers, as an important tool for effective and efficient discovery processes. In his own words, he suggested that "… until there is judicial opinion approving the use of predictive coding and artificial intelligence, counsel will have to rely on this article as evidence of judicial approval", the growing interests among judicial officers ever since suggests that artificial intelligence is there to serve judicial officers in the same way it serves lawyers and legal researchers. Remus (2014) submitted that the rapid use of artificial intelligence in the legal sector will follow similar adoption by judicial officers as there needs to be a convergence between the two for the effective judicial process. This implies it is not difficult to confirm by artificial intelligence processes in court a discovery that has already been conducted by artificial intelligence. In the case of Silva Moore v Publicis Groupe, the court was tasked to deal with a case raising a question concerning a discovery dispute by using predictive coding. The court reasoned that the accuracy of technology has been well established in discovery processes and document conventions. The court further reasoned that accuracy or artificial intelligence-enabled discovery processes ensured the interaction on man and machine that the court was direly in need of to examine critical court cases. In this particular result, the court ordered that in an e-discovery process there is a need for transparency and rapid training of the user. Additionally, the court announced that computer-enabled, artificial intelligence assisted reviews are now considered approved for certain cases.

Several notable judges around the world have spearheaded and championed the use of artificial intelligence and emerging technologies in law. In the United Kingdom one of the leading judges, Henry Brooke was well known for the profound interest he took in legal technologies. He was closely involved in many initiatives and efforts to create an online court through which decisions could be made virtually through the use and adoption of current technologies. Henry Brooke was also instrumental in convincing judicial officers to adopt the universal practice for dividing judgments into paragraphs numbered and structured in such a way, and by using

neutral citation for referencing, as to improve searchability (Hanson, 2016). This is an important achievement in the context of advancing the use of artificial intelligence in the legal profession. Because most artificial intelligence algorithms rely on structured data, which encourages easy referencing and enhances greater searchability, this practice goes some way to establish the technology viably.

According to Susskind (2018), the whole idea of adopting artificial intelligence for judges must be based on agency. In the current legal practice, judges are considered independent, using their independent legal acumen and personalities to reach decisions. Their thought process is considered to have a high degree of precision and they can determine and analyze cases to the highest degree. However, with the increasing adoption of artificial intelligence by lawyers, it thus means that judges are making judicial decisions on their own cases done by artificial intelligence, which are generally considered highly accurate and better prepared. The argument as Balkin (2015) puts it thus if certain computer algorithms are considered more accurate than human lawyers, then are judges competent enough to handle these complex cases without a direct reference to the same computer algorithms?

However, in this regard, Balkin (2015) put it forward that when we talk about the adoption of artificial intelligence in the courts by judicial officers, there is a need to think more specifically of not just control of power which rests with the judges, but also reflect on how the agency of representation should be conceptualized. Here the basic questions fall around issues of liability for erroneous decisions, machine accuracy, and its power of conviction as well as the legal personality of the artificial intelligence machines. The problem is mostly influenced by, as Newell and Marabelli (2015) put it, a series of interconnected problems regarding lack of knowledge, technical understanding and precise skills on part of the judges, and an unwillingness by programming entities to disclose the coding which they have used so that even with that technical expertise, it is difficult to dissect the current phenomenon. The other problem is mainly that there is a certain amount of rigidity in the interaction of coding and the law. Balkin (2015) suggests that if these challenges are not well addressed, then the technical questions regarding the use of artificial intelligence in judicial interpretation, or aiding of judicial work, will remain questionable. Ultimately, if judges are not convincing, that means even adoption by lawyers will be limited.

Hanson (2016) has argued that artificial intelligence algorithms are closed systems, they may not be able to capture everything of significance for resolving human conflict. In the application

of the law, the common and standard open-textured concepts like fairness, justice, and equality may create the potential for a critique of the rules being utilized; and this opening creates room for wider uncontrolled values, not explicitly encapsulated within the artificial intelligence algorithm, to enter into the equation and influence the outcome. This is also true even in the use of artificial intelligence in statutory interpretation. Golder (2015) suggests further that this is more pronounced in civil cases to which artificial intelligence is expected to assist Judicial officers in making right and concrete decisions. He further suggests that there is usually a disconnect in the comprehension available in the human applications of artificial intelligence algorithms and the understanding of how the algorithm was coded. This brings the issues of intersection between the artificial intelligence algorithm and the human thought process into play. Judicial officers are thought leaders. Whatever algorithm they use is not expected to convince them to discard their thought process, but rather be of persuasive value to the *ratio decidendi* reached by a judicial officer

Alston (2019) identified two problems relating to the adoption of artificial intelligence in the judicial system, the first is that governments are reluctant to regulate tech firms for fear of manipulation and stifling innovations. Secondly that at the same time the private sector is making efforts to resist adopting legal solutions that aid judicial interpretation when designing their systems. In this regard, Alston suggests that the world is slipping into a society involving round the clock surveillance influenced by the perils of algorithmic decision making. He argues that in the future there is a potential and pending difficulty in appealing against computer determinations and computer-assisted judicial decisions. As a result, it will also be complex to plead extenuating circumstances against an algorithmic decision-maker, as artificial intelligence always ensures that judicial officer considers all appropriate judicial channels when making decisions.

According to Bull (2019), it is mercy rather than justice which mostly influences judicial decisions, and which is the foundation for judicial systems. He suggests that mercy is a concession by the powerful to the vulnerable through which rules set by the powerful are interpreted to stabilize society. While talking about robotic politics in the same book, Bull (2019) argues that with a world that is increasingly becoming dominated by artificial intelligence, humans are becoming more vulnerable to the power that is outside the usual domain of knowledge and control. In this context Bull (2019) is suggesting that artificial intelligence-powered solutions for judicial officers should be programmed with a greater capacity for mercy than justice.

Susskind (2019) is of the opinion that adopting artificial intelligence in assisting courts to reach decisions places the global democracy efforts under pressure, he argues that law is both a product of democracy, which is in the form of statutes passed in parliament by democratic process, and the foundation of democracy as it creates a platform for protecting rights and capacities of people. This view is supported by Runciman (2017) who argues that artificial intelligence has the potential to disconnect democracy from the people in the public space as it limits public scrutiny of decisions made, and it makes a standard appeal to morality, which is not always minimal. The test case, as an example, would be how a court determines the extenuating circumstance in considering between aggravated indecent assault, assault and attempted rape to a woman subject to current laws[21], or worse still the extent of aggravation which separates murder and culpable homicide cases. It is in this context that Susskind (2019) concludes that the most important and immediate beneficiaries of an artificial intelligence-powered judicial system is the state, the elite, and the politicians. In reaching to conclusion, Susskind (2019) argues that the state will have a supercharged ability to enforce the law and control the people, while certain powerful technology firms will be able to define the limit of human liberty, influence the independence of the civil justice system, determine the performance and health of modern-day democracy and decide the vital and most important questions of social justice. In this case, theoretically, the role of judges and magistrates in cases outcome will be replaced by predictive coding as suggested by Remus (2014)

According to Re and Solow-Niederman (2019), AI promises to replace, assist, and modify the role of the human in judicial decision-making in courts. In the present, artificial intelligence is already supporting the various aspects of how judicial officers decide cases; and the prospect of having robot-controlled judges is increasing and sounds plausible each day. They suggest that artificial intelligence will affect the adjudicatory values that are held by legal actors and the public. The impact is more likely to be felt in criminal justice and appeal processes where the notions of equitable justice and mercy based on morality converge as suggested by Bull (2019). It has been suggested in the book that by offering efficiency and a clearer appearance of judicial impartiality, artificial intelligence assisted judicial decision making will assist in fostering and directing the society toward codified justice which favours standardization than judicial discretion. It is also considered that artificial intelligence assisted judicial decision making will unearth new concerns relating to its ability to make the legal system

21 Criminal Procedure and Evidence Act SA/Zimbabwe have sections through which the three are considering different crimes, but the foundation is the same.

incomprehensible, data-based, governed by alienating rules, and a great element of disillusioning. This might point gradual to a reduction of all human-centred judicial decision making and create a new emerging structure of how the law is codified, developed, and interpreted. The principles of international law will thus converge, and influence states, which might not even have ratified them, as artificial intelligence-powered systems can absorb into themselves the millions of judicial sources existing.

In South Africa, while not much reliance has been placed by the courts on the use of artificial intelligence in judicial decision making, it is quite notable that the courts have warmed to the idea that artificial intelligence can help in improving cases that are handled by judges, adding that some of the cases the courts handle could be easily assisted with the use of emerging technologies. In the case of *AB and Another v Minister of Social Development*, the court accepted that in civil cases where issues of surrogacy are raised, utilizing emerging technology like artificial intelligence to determine and predict certain birth and genetic outcomes are necessary and acceptable. In the case of *Randgold and Exploration Company Limited and Another v Goldfields Operations Limited and Others*[22], The South African Supreme Court accepted that courts are permitted and should be encouraged to accept the contribution of technology to aid judicial decision making. It is at this point, however, that while there has been a growing appreciation and support for utilizing such technologies, not much has been done to aid its implementation.

In Zimbabwe, again in the case of *Re Regina Chimhanzi*, the courts accepted the use of technology and encouraged local developers to come up with ideas that will help the courts expedite certain cases which have taken long, because of complexities and lack of technological expertise. One ready step already adopted in both South Africa and Zimbabwe is in the computerization of the Deeds Registry Office. With the advent of artificial intelligence, if the deeds office is computerized, cases involving property disputes, ownership and land regulation can be expedited quickly and discovery and privilege issues will be dealt with great ease.

2.16 Limitations of artificial intelligence

22 Randgold and Exploration Company Limited and Another V Gold Fields Operations Limited and Others (27672/2008) [2019] ZAGPJHC 436; [2020] 1 All SA 491 (GJ); 2020 (3) SA 251 (GJ) (28 November 2019.)

Remus (2017) tendered that artificial intelligence and predictive coding should not be seen to replace the role of lawyers. According to Stuart (2016), the demand for lawyer labour continues to be on the rise. We have to look forward to what robots can and cannot do. In most cases, the basic elements of a computer are that it uses deductive rules to execute orders. It is designed to execute a set of step by step rules and not all data can be condensed using step by step rules. In the case where the computer is allowed to learn and predict legal behaviour, the risk remains one that needs strategies of averting legal liability.

Remus (2017) further posits that as one limitation of data-driven rule programming, artificial intelligence is based on the common set of rules existing, for example, a machine cannot formulate a cause of action in a case, it cannot be programmed to classify documents needed. It still needs to be loaded with data through which it runs a certain type of algorithm for analysis and develops predictions.

The task has to have an underlying or hidden structure. A judge can make different decisions based on the same facts, a new situation which may not be accountable in the data through which the machine is trainee, there are challenges then in predictions that are provided by the computers. Computers are not good at dealing with contingencies outside of their program though they are trained; and leaving them to learn and unlearn certain fundamental elements of legal work could be prejudicial and can raise legal liability issues in the future.

Remus (2017), suggests that natural language processing has limitations when it comes to outside interactions. One of the most important elements of law is that physiological interpretations cannot array the emotional elements to the extent needed, although it can give conclusions based on cognitive and facial interactions. In such cases, computers have limitations in interpreting unstructured human interaction which is a key part of lawyering.

According to Dysat (2019), The underlying legal work is insufficiently structured to be replaced by lawyers at this point, particularly because legal reasoning which forms precedence cannot be pre-dated and adjusted as we cannot go back in time to interpret unstructured human interactions, which formed the basis of how the precedent cases were reasoned. This becomes complex and unreasonable.

Legal analysis entails the interaction of law and fact which leads to a decision to act in a certain way, be it in case preparation or precedent reasoning (Cath: 2018). In most cases, a legal issue is not decided based on legal reasoning but sometimes based on a clear law (what if). In other cases, issues of classification are raised but the court can dismiss them based on the justice of

the case, further in some cases there is a direct law which needs to be stamped, while some cases are decided based on technicalities and procedural law issues. All these are difficult to automate. Additionally, the use of precedent is difficult to automate, because the same case is used to support opposing positions, *obiter dictum*[23] can be interpreted as persuasive *ratio decidendi*[24] in another case.

A closer look at legal technology companies like Ross Intelligence will suggest that legal memos as simple instructions, still requires a lawyer to review what they can do. In other words, the technology is helping lawyers becoming more efficient but not replacing the legal writing process (Beck, 2016).

Document review in discovery has been successfully automated because it requires a large input of unstructured data, while for example, in due diligence is not successfully automated, as it is based on unstructured human interactions and often involves huge volumes of data that need classification. In discovery practice, the goal is to identify documents that are relevant to a present list and to questions, and to create structured tasks, for example, which can be programmed to look for documents within a set of individual linguistics prototypes. However, in due diligence, one would want a program to search for things you are not expecting. Unless there is something that instructs a computer to look at that, the computer is likely to miss it.

Contrary to conventional wisdom, the areas where computer technology is making progress is not directly related to who is doing the work in a law firm. The pattern is not nearly that neat; for example, document reviews in discovery practices are often performed by junior lawyers, but for example, legal writing is done by lawyers from the level of junior associates up to the highest level in the firm as a partner's edit. There is no direct correlation because the interaction is often unstructured and thus it is difficult to automate unstructured human interaction.

Computers are impacting the demand for lawyers' service in terms of the work they do, but the impact has been limited, the pace and trajectory on technologies will not develop in a vacuum, regulatory structures have remained the same. Law is a static and rigid field that is complex to change as rules are made for the society and societal dynamics are not easily automated. Even in access to justice, there is a point at which a person will need to see a lawyer. Data-driven programs are efficient but there is a need to explore the extent to which these programs can operate independently (Leny and Remus, 2017)

[23] Persuasive facts leading to conclusions but not adequate to result in a decision.
24 Reason for a decision (indicates matrix between the law, facts and moral ability.

According to Remus (2017), one of the important features of artificial intelligence in law is its ability to improve efficiency and effectiveness in the provision of legal services, artificial intelligence employs algorithms which help speed up document automation processes, while identifying errors for fixing. Such a scenario, however, is seen as counterintuitive, since the legal sector has relied on billing and charging times; and efficient processes reduce the amount of time and thus the income of legal practitioners. However, it has been argued that law firms adopting artificial intelligence are likely move faster to efficiency and more productivity and provide better service to their clients

Balkin (2015), suggested that artificial intelligence algorithms will always create problems for law, because it is always difficult to predict how and what they will do when they interact with their environment, and get independent functionality exposure. This has been supported by Susskind (2019) who refers to this interaction as emergent behaviour of artificial intelligence. Such a challenge raises difficult questions around the normative stature of artificial intelligence, as they are seen to cause harm to the ways things are implemented and cause delictual injuries. To this end Balkin (2015) is of the opinion that combinations of artificial intelligence and legal thought could possibly direct and constrain human behaviour. This is particularly so if the expert systems, of which artificial intelligence is an example, are left to self-improve and thus self-regulate, in their process of adaptation, they may become unpredictable and vary the expectations to which they are able to assist in legal work. With regards to discovery, is it possible that rules of discovery may be varied in the process of improving adaptation by these machines? This will ultimately result in changes in accepting and utilizing precedent extracted from artificial intelligence assisted cases.

2.17 Chapter summary

This chapter discussed the different approaches and perceptions taken by scholars on the role of artificial intelligence in improving legal systems. It takes a review of existing initiatives and artificial intelligence tools such as Lex Machina, Ross intelligence, Diligence; and discusses the various scholarly reviews around the functionality of such systems. Additionally, the study presents a discussion on the future and role of artificial intelligence in legal analytics and well as challenges presented. In the end, the chapter concludes that artificial intelligence plays an important role in improving legal systems, however, this role can never be adequate to replace a human lawyer as the level of intelligence requires deeper developments, innovations, and

learning. The study looks further at the nexus and convergence of work between lawyers and judicial officers. It accepts that the effective delivery of justice is achieved when there is uniformity in operational procedures between the two institutions. As a result of the discussion, it is important to note that artificial intelligence is one of the most important convergence points for work between courts and lawyers going into the future.

Chapter 3 Methodology

3.1 Introduction

This chapter presents the research methodology and the structure of the research process adopted for this thesis. It discusses the mixed method approach as the appropriate research approach in this study. The chapter defines and maps out sampling procedures and data collection tools and strategies employed to collect data from the various sources. In addition, adequate detail on the methods of data analysis and ethical issues involved in this study are discussed.

3.2 The research design and approach

A research design is a plan of action that provides procedures and guidelines for selecting the research methods and techniques which are utilized to meet the research goal (Cormack, 2000:25 Smith, 2013). Kirubi (2018) further views a research design as a combination or subset of methods and procedures used to prove certain research variables through efforts which involve the convergence of philosophy, the strategy of inquiry and strategies utilized in the thesis (Creswell, 2009:5)

According to Kersley (2017.12), a research design is there to guide the researcher in the planning and execution of research in a process and way that it achieves the intended goals. Almaiki (2017:52) reiterates that the research design refers to the overall strategy chosen to integrate the various components of a study to become coherent and logical and thus enables the effective adjudication of all research issues that are addressing the research problem.

In this thesis, a mixed-method design was adopted as it can marry the knowledge, practices, and perceptions of qualitative respondents with the generalizations from the survey of quantitative respondents. This enables the acquisition of more in-depth and richer data which can give an evidential basis to conclusions.

This thesis seeks to establish the role which artificial intelligence has played in increasing legal efficiencies and accuracy, reducing legal bureaucracy, reducing the cost of legal labour as well as increasing access to justice. It further seeks to provide guidelines for which artificial intelligence applications can be developed in the context of knowledge modelling and informatics. Because of the complexity of the thesis, a mixed-method research design was deemed more appropriate. This entailed reviewing existing literature on what other scholars in

the field have written about the use and adoption of artificial intelligence tools for the legal sector. Selected literature is that which provided reference to such tools that were analysed in the case study. This allowed a cross triangulation of data and knowledge that was already generated. The study also utilized a case study approach on the existing artificial intelligence tools in place to analyze and depict how they can be adopted for privilege classification and discovery purposes[25]. Furthermore, a survey was designed to solicit views from law firms in South Africa and Zimbabwe on the utilization of artificial intelligence systems. Key informant interviews were conducted via skype and in person to selected individuals from prominent Information Technology (IT) companies to get their experiences in designing such systems and developing software and to solicit their views on the opportunities that arise for artificial intelligence services in legal businesses.

According to Frels, (2013) the mixed-method research approach is a paradigm which combines the philosophy of pragmatism, follows the structure and sequence of mixed methods research, which included the sequence from fundamental principles and any useful research logic derived from qualitative or quantitative research. It is important and helpful for producing relevant and applicable research findings and places great reliance "… on qualitative and quantitative viewpoints, data collection, analysis, and inference techniques combined according to the logic of mixed methods research…" in order to address the researcher's questions. The mixed method research is further privy and involving local and the broader realities of the socio-political, resources, and capacity aspects.

Greene et al. (1989) have identified five different research purposes for having a mixed research method: these include the following;

- To allow for easier triangulation purposes (converge data sources)
- Compliment the measurement of overlapping and different facets of an occurrence or phenomenon specific to a study
- To help in the development of the other research method
- To help in the discovery of the paradox and contradiction as well as new perspectives or frameworks and the re-casing of research questions
- To expand the range and depth on an inquiry.

[25] This was done in Chapter Two.

The mixed methodology entails the use of a key informant guide targeted at artificial intelligence experts who can give more depth information on the operation and functionality of artificial intelligence systems in the legal sector. It further involves a structured questionnaire that was designed and targeted at law firms on their utilization of artificial intelligence and general technology levels. Collecting data from these sources enabled triangulation which in turn led to proper validation.

3.3 Sampling

The study utilized purposive sampling to come up with respondents. Purposive sampling is a non-probability sampling procedure in which respondents are selected from a population based on their underlying interest in the research (Brewerton and Millward, 2010, Saunders et al., 1997). It is a strategy in "which particular settings persons or events are selected deliberately to provide important information that cannot be obtained from other choices" (Saunders et al., 1997). Brewerton and Millward (2010;116) posit that purposive sampling is effective in predicting outcomes and when selecting key constituencies for research. Saunders et al., 1997 further supports this assertion by arguing that purposive sampling is a combined use of probability; and purposeful sampling can effectively be employed to a very large pool of potentially rich information sources, where there is a potential to select the best response category. Purposive sampling enables one to use judgment to select cases that best answers one's research questions and meeting research objectives (Saunders et al., 1997).

Responses for purposive sampling were collected from the most productive sample to answer the research questions. This can involve developing a framework of the variables that might influence an individual's contribution based on the researcher's practical knowledge of the research area, the literature studied, and other pointers from the thesis. The strata used to define the population for the key informant interviews included location, preference, reach, their contribution in the field of artificial intelligence, and accessibility of data from the chosen respondents as well as the ease of collecting data.

The sample population for the thesis draws from a selection of law firms that are distributed across two countries, Zimbabwe and South Africa. All law firms were eligible for participation in the thesis.

These law firms are too large and too broad in terms of accessibility for any purposeful sampling strategy oriented toward the intensive study of the particulars of each case. Accordingly, each law firm could initially be chosen using random sampling. In a random

sample, the nature of the population is defined and all members had an equal chance of selection

Table 3: Sampling

Response category	Sample	Accuracy level
Law firms in Zimbabwe	27	95%
Gauteng Law firms	78	95%
Total for survey	105	
Senior lawyers for KII	10	
KIIS with Tech Cos	10	100%
Total for KIIs	20	100%
Cumulative total	125	

Source: study data

3.4 Sample size and population

There are about 2300 Law firms in Zimbabwe[26] and about 8000[27] in South Africa, there are about 1749 Law firms in Gauteng Province in South Africa and 720 in Harare. Using deliberate targeting the researcher identified law firms in Gauteng and Harare provinces and other bigger cities with marginally bigger law firms.

A Raosoft sample size calculator was adopted to determine the number of law firms for the thesis. The formula utilized for the thesis for calculating the sample size for categorical data.

$$x = Z(^{c}/_{100})^{2}r(100-r)$$

$$n = {}^{N\,x}/_{((N-1)E^{2}\,+\,x)}$$

$$E = \mathrm{Sqrt}[{}^{(N\,-\,n)x}/_{n(N-1)}]$$

[26] Law Society of Zimbabwe, every year the Law society provides figures and a list of practicing lawyers and the law firms they practice at.
[27] Law Society, South Africa, the numbers for both Zimbabwe and South Africa are estimates based on the data provided form the law societies. It is important to note that these are firm and not the number of lawyers. Some lawyers prefer to act as Advocates and thus have no law firms.

where N is the population size, r is the fraction of responses, Z(c/100) is the critical value for the confidence level.

Table 4: Population and sample calculation

Population size	4049
Confidence level	70%
Margin of error	5%
Response Distribution	50%
Recommended Sample Size	105
Adopted sample size to cater for margin of error	124

The recommended sample size, which would be the minimum to achieve the error rate is 105. However, the study was not restricted to maintain the minimum response rate. In order to maintain a greater response rate, a total of 141 questionnaires were administered.

Sample selection

In selecting the actual respondents, the study adopted a random selection process. The random process was based on a list of law firms readily available for both Zimbabwe and South Africa.

While the process of selecting law firms was random, in some instances, a deliberate decision was made to ensure that certain law firms with a specific trait were not left out[28]. As a result, certain law firms from both Zimbabwe and South Africa were picked. The generic process of selection was not premised on any general sampling criteria on selecting respondents. The researcher used a one to 20 counting process, where at the end of the 20th count a random respondent was selected. Each target within the population stood an equal chance at selection.

Only one respondent was eligible per law firm. This was to ensure that there are balanced responses from the legal sector, and that the sample is representative of the law firms as opposed to lawyers as individuals. The decision of choosing the actual respondent rested with the respondent law firm. The recommended and preferred respondent was a senior partner or

[28] This was a deliberate search on law firms that have commonly and publicly accepted use of legal technologies in their work.

an IT person from the law firm. The assumption was that the person responding would have enough IT and legal knowledge to respond informatively to the issues raised,

In administering the questionnaire, there was a deliberate attempt to ensure that the person receiving the tool was in a position to direct the tool to the best placed respondent in the law firm. This was made in a number of ways which included the following:

- Requesting that the questionnaire be responded to by the appropriate person;
- Clarifying the rationale of the study in the introductory mail;
- Sharing the questionnaire with a senior member of the law firm or the person in charge of administration

3.4.1 Survey questionnaire

In order to find out the extent to which law firms in South Africa and Zimbabwe have adopted artificial intelligence technologies to improve their legal work, the thesis employed a survey questionnaire administered to law firms. The tool was targeted at 124 laws firms in Harare and Gauteng Provinces and was administered via SurveyMonkey and an Online Open Data Kit link. 50% of these were in South Africa (Gauteng Province). The survey tool focused on systems adaptation, as well as the future potential and capacity of law firms to adopt modern technologies to improve their work.

The survey tool collected quantitative data useful for deriving statistically useful information, as well as usage patterns and trends. The advantages of utilizing a survey tool as provided by Saunders et al., (1997) are that survey tools are capable of obtaining information from a large sample of the population and they are also suited for gathering demographic and economic information which describes and relates to the composition of the sample. Surveys are further viewed by Saunders et al., (1997) as inclusive in the type, margins, and a number of variables that can be studied and thus need minimal investment to develop and administer and as well they are easier from which to derive generalizations for the population.

The survey tool developed elicited information about perception, knowledge, practice, and attitude of law firms towards embracing artificial intelligence tools in their business practice. Such a KAPP (knowledge, attitude, perceptions, and practice) survey, formed an opinion that would be generalized for the target population as a whole about the adoption and practicability of artificial intelligence solutions to legal work.

To get maximum responses and quality data, the questionnaire was designed to have both closed and open-ended questions. This was based on the assumption that certain responses needed deeper configuration and responses.

A pre-test was done for the structured questionnaire, administered to a random 8 Law firms in Zimbabwe with which the researcher has connections. The data was treated primarily as pre-test data and not utilized to reach conclusions for the thesis. Administering questionnaires and generating responses were planned for three weeks.

Questionnaires were shared via email, with participants asked to respond and return either by mail or complete an online based tool. This was done in order to set the respondents at ease when responding to the questions.

3.4.2 Key informant interview

The thesis employed key informant interviews (KIIs) in collecting data from high tech companies, developers, and artificial intelligence firms that specialize in legal applications. KIIs were employed as it is an extremely flexible tool for research purposes especially when it is utilized in a mixed-method research approach (Breakwell, 1995). Key informant interviews are utilized to identify areas for more detailed exploration and text analysis (Saunders et al., 1997).

According to Brewerton and Millward (2010), interviews are one of the most common ways which are utilized to collect data in qualitative research because they are useful in providing opportunities for the researcher to collect reach and meaningful data (Rouston, 2010)

Key informant interviews were conducted with Information technology companies offering legal solutions, specifically people in operations involved in ideation and development of artificial intelligence solutions. Ten respondents were selected for this category. Key informant interviews were also conducted with senior management from selected law firms to assess their knowledge, attitudes, perceptions, and practices with regards to adopting artificial intelligence in their legal business. Of particular value is the issue of perception, when assessing whether they view artificial intelligence technologies having a symbolic place in legal systems and the potential for improving the profession. A total of 10 key informant interviews were targeted.

Two structured interview tools were developed and administered mostly through skype video calls. An online interview via skype enabled the researcher to reach people who could provide

quality data, who resided in places and towns that would otherwise have been too far away and expensive to administer.

No pre-test was done on the key informants; collection of data was simultaneous, with the collection of data using the structured questionnaire.

3.5 Measures of trustworthiness

Issues of trustworthiness in research form a key variable in the appreciation of research processes (Brewerton and Millward, 2010). Such issues include specific issues like transferability, reliability, and objectivity and such issues cannot be avoided regardless of the methodology that is adopted for the research.

In this thesis, trustworthiness was ensured through the utilization of data triangulation processes, where data obtained through one source methodology was compared variable by a variable with data from other sources. Further data was obtained from multiple sources which were an experiment, a survey, and key informant interviews, and as well a text analysis to provide a comprehensive case basis through which reasonable trust can be formed.

Brewer and Hunter (2009) are of the view that the adoption of different methods of data collection helps in compensating for individual limitations of one study against another, but exploits their respective benefits.

Validity is referred to by Creswell and Tashakkori (2007) as meaning being on the mind of people developing measures and those who would want to have valid outcomes from a particular research process. Dennick and Travakol (2011:16) posit that validity is often affected by the general characteristics of the population (the research participants), the engagement in the subject selection, methods for data collection as well as the explicitness in describing independent data variables. To ensure that validity in the research was not affected, the researcher collected data alone without employing many subjects, and data was collected in real-time. Validity was tested through comparing results obtained from similar historical researches in the law and relevant areas of technology, as well as by triangulating data obtained from other secondary sources.

Reliability in the research data was strengthened through pretesting of tools. The thesis questionnaire was pretested on eight lawyers who were able to provide feedback on its ability to extract relevant responses. To establish reliability is important, as stated by Dennick and

Travakol (2011, 53) who are of the opinion that it enhances the accuracy of the thesis assessment and confidence in the data collected. Dennick and Travakol (2011) further view reliability as a measure of the degree to which an assessment tool can reproduce consistent results when it is applied in another yet similar environment. This is supported by Kirk and Miller (1986:20) who argue that reliability relates to the degree to which findings of a study are independent of the accidental circumstances of their production.

Objectivity is defined by Kersley (2017) as relating to the truth or independent reality which exists outside of any research or investigation. Brewer and Hunter (1989), put forward the notion that utilizing different methodologies helps in compensating for individual limitations in the ways of collecting data and exploits their respective benefits.

The research maintained objectivity by ensuring the tools were focused on the research questions. Further, the researcher made sure that practical and realistic questions were asked that would be answered easily, objectively without the subject being motivated to lie. All questions focused on what was already existing and participants had options to skip questions they could not objectively provide information on.

3.6 Data analysis

Qualitative data obtained from key informant interviews were analysed through content analysis using Atlas software. Data was consolidated into one dataset for ease of analysis where the content analysis was used to pick key descriptions that were used for a detailed narration of the findings. Data were analysed and grouped per variable for ease of reference. Key Informants who provided data for more than one research question had their data entered into two datasets to derive the different variable meanings relating to each objective to which they responded. The variables for each data set were analysed and trends considered which were then classified to form the narrative descriptions and conclusions

Data from the survey were analysed using the SPSS statistical packaged. The online data set was migrated via excel into an SPSS variable sheet. Responses were grouped per objective, cross-tabulations and multiple response systems were classified for ease of reference. Data collected from the two sources were combined at the interpretive level of the research to ensure triangulations. Common variables generated via content analysis were referred to in analysing quantitative data.

Quantitative data collected is presented in tables, graphs in percentages, and statistics. These provide generalizations for the conclusions reached. Qualitative data was provided to support the statistics provided through narrative descriptions as notes, heads on titles.

3.7 Ethical considerations

According to Creswell (2009), when considering issues of ethics, one must decide whether the benefits of undertaking the research will outweigh the possible dangers and risks presented to the subjects.

The research methodology utilized does not present direct harm to the subjects, however, when interviewing and engaging respondents for the survey, the researcher ensured adequate information was provided for respondents to decide on whether they wanted to participate. Legal information is highly classified and private, therefore the researcher utilized existing cases already in the public space. In cases where responses delved in pending cases, the researcher ensured the privacy and confidentiality of information. Full confidentiality and anonymity of the participants were guaranteed and knowledge of the research outcome was assured to the participants.

The researcher was guided by the do no harm principle which ensures that in all research or development programming, all activities and undertakings should not present dangers or harm to the subjects or beneficiaries. Creswell (2014) argues that researchers must decide whether the scientific and social benefit of carrying out a research outweighs the possible risk to the persons who participate in the research process. To ensure interviewees and respondents do not face any risks, authorisation to conduct the research was sought. The researcher sought authority from all respondents, whether as KIIs or for replying to the structured questionnaire. Furthermore, the researcher sought permission from those being interviewed for recording the skype interviews.

The purpose of the research was made known to the participants and knowledge of the results was assured to them; data security was guaranteed, to which the researcher undertook to protect the information and ensure that it would not enter the public domain without the consent of the study subjects. Full confidentiality of all information and the anonymity of participants was maintained.

The researcher obtained ethical clearance from the Ethical Clearance Committee which has a mandate for ensuring that all research is conducted within the required standards of the University.

Participants were not offered any inducements or incentives to encourage their involvement in the research. The researcher affirms participation was voluntary and not motivated by financial or other promises. No financial or other obligations were exerted on the participants in any other way. Liability for the thesis lay with the researcher, who ensured that participants were interviewed in their precinct places to ensure they do not incur any transport costs. All research participants were above the age of 18 and thus needed individual consent.

3.8 Chapter summary

This chapter discussed the qualitative research methodology that was adopted for the thesis. It provided the sample which was formed out of key stakeholders both in government, data was collected over one month from the variety of participants listed. Data collected was analysed through SPSS, Atlas ti and manual content analysis, which looked at topical data and broke it down into several variables which were then grouped for in-depth manual analysis. Data was analysed in separate categories based on each research question. The researcher was guided by ethical considerations which ensured getting consent, doing no harm, and interviewing respondents without coercion. Only people above the age of 18 were involved in this study.

Chapter 4: Presentation of results

4.1 Introduction

This chapter presents results from the data collected through structured questionnaires and key informant interviews. Data was collected in two distinctive legal jurisdictions (Zimbabwe and South Africa) which have the same legal system based on the Roman-Dutch law with similar laws, context, and the juristic nature of their operations. Data is presented using narrative descriptions as well as in tabular, graphic, or pictorial forms. General results indicate that less than 20% of Zimbabwean and South African law firms utilize artificial intelligence in their work. While a slightly significant higher number are aware of artificial intelligence but are hesitant about its implementation. Further results from the analysis indicated that artificial intelligence is perceived as a disruptive technology although there is a general acknowledgement that it should be considered as a future of the legal profession.

4.2 Sample response rate

The thesis employed a mixed-method approach to collecting data. This involved a structured questionnaire administered to law firms targeting senior lawyers and information technology staff employed at law firms. A structured key informant guide was also utilized to collect data from top tech companies or companies that have utilized artificial intelligence mostly to get developers and marketers' opinions on the use of artificial intelligence in the legal profession. Questionnaire data was collected using a personalized Kobo Collect tool as well as a Word tool, while Skype and Zoom interviews were conducted for key informants that were not easy to reach due to distance and mobility issues. For the quantitative tool, respondents were asked to respond by their preferred choice, which ended up being completing the office tool and responding back by sending an email. Both options did not affect data quality as the responses remained the same. Deliberate efforts were made to remind participants of the need to complete the tool as well as sending email reminders which automatically popped in on each 5th successive date without a response to the email. In addition, two formal reminders were sent, to those who had not responded.

While the minimum number of respondents suggested using the Raosoft sample size calculator 105, 141 questionnaires were administered in order to maintain a good response and error rate. 124 responses were achieved out of the 141 administered questionnaires reaching an 88% response rate. All the 141 questionnaires were responded to within the required time.

Table 5: Sample response rate of survey questionnaires

Sample Response rate	
Minimum Sample size	105
Adopted sample	141
Administered questionnaires	141
Returned questionnaires	124
Response rate	88%

While the 88% response rata is largely reasonable. It is largely due to increased follow up with the study respondents. Two formal reminders were sent to the respondents as a follow up to ensure responses were reached. Some law firms did not respond at all despite the regular follow ups.

Table 6: Sample response rate of key informant interviews

Sample Response rate	
Sample size	10
Arranged Interviews	10
Interviews conducted	6
Response rate	60%

Key informants were conducted with senior staff in four law firms who provided adequate information. Additional key informant interviews were set for tech companies to provide key insights on the functionality of artificial intelligence in law firms. A total of six out of 10 scheduled interviews were conducted giving a response rate of 60%.

Table 7: List of key informants

Respondent Firm/Company	Number of Respondents	Respondent Country/Province
Webber Wentzel Attorneys	1	Johannesburg South Africa
Luminance (Marketing office)	1	International Office
PPM Attorneys	1	Pretoria South Africa
Bowmans Law	1	Midrand South Africa
Mutandiro and Chitsanga	1	Harare Zimbabwe
Honey and Blakenburg	1	Harare/Bulawayo
Ross Intelligence (Marketing Office)	1	International Office

Only two tech companies were interviewed as key informant respondents, these are Ross Intelligence and Luminance. The two tech companies are rapidly growing in Southern Africa with their products being continuously demanded by law firms in the two study countries.

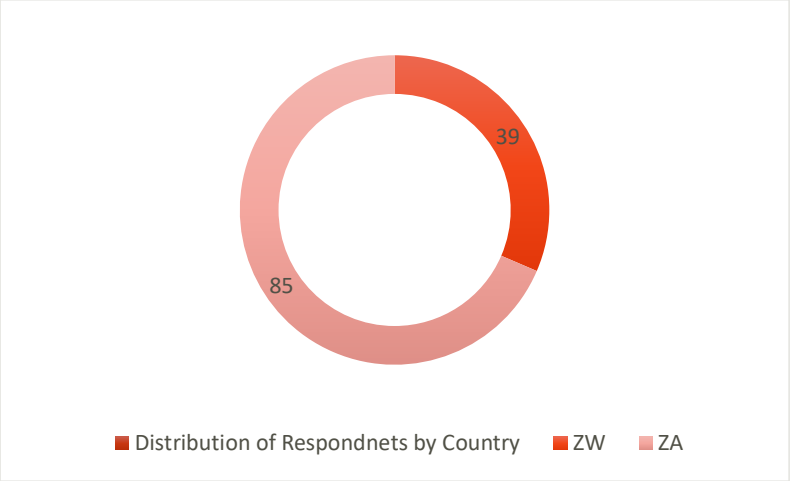
Four responses were obtained from experts in law firms. The four were selected on the basis of their reasonable adoption of artificial intelligence in their law firms. In particular, was the general and growing interest among the law firms in Zimbabwe, with the selected law firms indicating greater interest in the adoption. Three of the four key informants expressed their unavailability while one did not respond at all.

The responses from key informants were triangulated and reconciled with data from the structured questionnaire to get more comprehensive conclusions.

4.3 Disaggregation of questionnaire respondents by location

Fig 14 shows the distribution of respondents by country. The methodology for the study was based on two countries, that is Zimbabwe and South Africa.

Figure 14 Distribution of respondents by country



Source: Survey data

Fig 14 indicates that 61% of respondents were in South Africa with 31% from Zimbabwe. This was due to the proportion of lawyers against the population for each country as well as the level of development in terms of information technology infrastructure for each country as well as general artificial intelligence outlook for each of the two countries. Table 6 below presents results on the distribution of respondents by city/ town in each country

Table 8 : Distribution of respondents by town/city

Distribution of respondents by Town			
Town	Country	number of respondents	% frequency
Harare	ZW	21	16.9
Gweru	ZW	3	2.4
Chitungwiza	ZW	6	4.8
Mutare	ZW	9	7.3
Johannesburg	ZA	32	25.8
Pretoria	ZA	30	24.2
Cape town	ZA	13	10.5
Port Elizabeth	ZA	4	3.2
Grahams town	ZA	2	1.6
Stellenbosch	ZA	4	3.2
Total		124	100.0

Source: Survey data

Johannesburg, Pretoria and Harare and Cape Town have the most respondents for the study as they were considered primate and had a higher distribution in each of the countries, (save for Durban and Kimberly in South Africa). These accounted for a cumulative 77.7% of the total respondents for the study. 50% of all questionnaire respondents were from Gauteng Province.

4.4 Availability of IT infrastructure in organizations

The thesis looked at the general IT maintenance for each of the law firms. The primary emphasis was on who is responsible for IT maintenance for each of the law firms that were sampled for the study. Table 7 presents results on the availability of full-time employees within each respondent law firm

Table 9: Availability of a full time IT employee

Do you have a full time IT consultant/ employee?			
Consultant	yes	no	Total number of respondents
Harare	14	7	21
Gweru	3	0	3
Chitungwiza	4	2	6
Mutare	4	5	9
Johannesburg	26	6	32
Pretoria	24	6	30
Cape Town	10	3	13
Port Elizabeth	4	0	4
Grahamstown	1	1	2
Stellenbosch	4	0	4
Total	94	30	124

Source: Survey data

The objective of understanding the availability of a full time employee was necessary in order to assess the capacity of law firms should they decide to adopt artificial intelligence, or if they already have artificial intelligence, to manage and support it, so that it can deliver the results that are expected. Ideally, high-end tech jobs require a full-time employee with extensive knowledge and capacity to deal with complex IT processes to manage the infrastructure. Results from the study indicate that 72.5 percent of the law firms have full-time IT consultants

or employees managing the IT infrastructure within their organizations. With only 27.5% not having a full-time employee or consultant, but having to rely on outsourcing. Generally, IT consultants are considered support personnel within the organizations, and as a result investment in recruitment and selection is not on the same level as being placed on the technical lawyers' team. While 72.5% represents the general respondent ratios for having a full time IT consultant, the result is slightly lower for Zimbabwe with a 64% response rate. This is because of the average size of law firms in Zimbabwe, which are relatively smaller as compared to their counterparts in South Africa. Additionally, the level and sophistication of infrastructure existing to support each law firm determines whether there is a need for a full time IT consultant or to rely mostly on outsourcing (Source: key informant interview, Law firm; South Africa).

It was also important to look at the IT infrastructure existing in each organization and relate to the capacity to support high-end artificial intelligence infrastructures like the use of machine learning or artificial intelligence-powered engines for supporting legal work. To achieve this, respondents were asked to indicate in multiple response format the IT infrastructure existing at their law firms. Table 8 responds to the IT services available in each law firm

Table 10: IT services existing in each law firm

What IT services do you have in your organization?		Multiple responses	
IT Service	Frequency	number of respondents	% frequency
Internet	124	124	100.0
Open source email (Gmail, Yahoo, Outlook)	45	124	36.3
Server/Host based email	75	124	60.5
Employee databases	85	124	68.5
Case databases	64	124	51.6
Networked system	96	124	77.4
Legal search subscriptions	57	124	46.0

Source: Survey data

While the internet has become a basic instrument for both homes and businesses, in Southern Africa the coverage remains limited (Moyo, 2018). However, in the study, all law firms surveyed had adequate internet cover for their operation, enough to support users on any infrastructure that requires the internet. While some consider the internet to be expensive, the majority see it as a necessity and basic instrument that sustains modern businesses.

The level and sophistication of IT usage varied with each organization. About 36% of the law firms are still resorting to using open source email and communication facilities such as Gmail and Microsoft Outlook email which they have no control of the security protocols. Such firms do not have standard and customized servers for their legal practice. 60% of the respondents, however, have established independent server-based email and communication facilities hosted in their name making them able to influence and control communication which gets in and out of their organizations.

According to one key informant (Luminance); legal work relies mostly and sometimes solely on casework. The majority of the work on client cases are handled in different ways depending on the dictates of each case. However, adoption of case databases remains low with only 51% of law firms indicating that they have a case database used for analysis, storage, and reference to each case in the time of need. The limited investment in legal case database provides an opportunity for utilizing artificial intelligence-powered case databases for managing legal practice casework and improving the effectiveness of law firms in dealing with client cases.

The number of law firms utilizing legal search subscriptions is low, with only 46% of the law firms indicating that they have legal subscriptions. The majority of law firms rely on open source articles or materials which exist in the public domain. The majority of the law firms in Zimbabwe rely on the Zimbabwe Legal Information Institute, while in South Africa they rely on the South African Legal Information Institute and any material published through the Judicial Services Commissions for both countries. Such material is not adequate to increase legal awareness. With several limitations as postulated by Matsikidze (2015), who is of the view that formal and state-controlled legal information dissemination methods cannot be solely relied on as there are censorship and control issues which might affect its independence. One key informant respondent from a Zimbabwean law firm, was agreeable to this assertion by indicating that there is a deficit of legal information in Zimbabwe, which is why the Zimbabwe Legal Information Institution has become the most important provider of legal information. This is despite its own limitations in terms of technology utilized.

Artificial intelligence presents a useful opportunity for providing useful legal search subscriptions that provide the end-user with the required data. Such tools include the use of Ross Intelligence and Luminance which link with different multiple sources of legal information to provide the searcher with the relevant data to their case. As such artificial intelligence provides an opportunity to bridge the gap existing in the search criteria.

68.5 % of the respondents indicated that they have employee databases, while 51.6% indicated that they have a case database. The study further sought to understand the types of legal databases existing in each law firm to determine the opportunities provided for artificial intelligence-powered engines for managing legal databases. 54% of case databases and 63.5% of the employee databases are based on the Oracle platform, which is the most common type of database in Southern Africa. Other SQL powered databases form the remaining database servers utilized in law firms with 35% of the case databases and 21% of the employee databases based on the SQL platform. It is important to note the importance and potential for automating such servers, considering that Oracle and other databases have also started to provide artificial intelligence-powered databases. Thus besides custom made artificial intelligence databases, existing top tech companies like Oracle and Microsoft Azure also provide the opportunity for expansion to cater for legal work. The other forms of databases utilized are Open office and access database. Such usage presents an opportunity for automating existing important elements of legal work, relating to document analysis, case predictions as well as information access and provisions. Some respondents indicated that existing platforms such as databases can be better automated for ease of reference and operation making legal work much easier. Table 8 presents a graphical illustration of the existing database platforms utilized by law firms.

Table 11: Types of legal databases in organizations

What sort of legal database do you use?		
Database	Case database use	Employee database use
Open Office	1	1
Oracle	37	54
Access	9	12
SQL	13	18
Virtual/Azure	1	0
Open Source	3	0
Total	64	85

Source: Survey data

4.5 Awareness, knowledge and usage of artificial intelligence in the legal practice

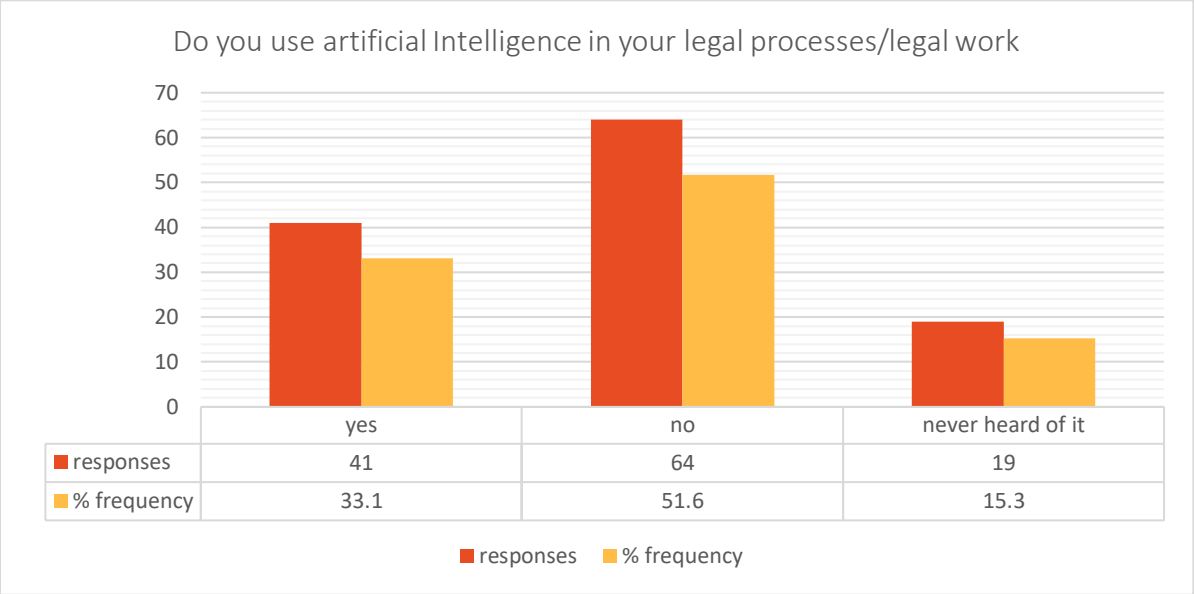
The study sought to measure the level of understanding and usage of artificial intelligence in the legal sector. Although the level of usage was a major variable in the study, the null response

was also a critical result as it presents the opportunities by which artificial intelligence can be leveraged to improve legal business effectiveness.

4.5.1 Use of artificial intelligence in law firms

The thesis sought to understand the level of usage of artificial intelligence among selected respondents. A question was asked on whether respondents use artificial intelligence as part of the general IT infrastructure existing in the organization. Fig 15 provides a graphical presentation of the results

Figure 15: Use of artificial intelligence in legal work



Source: Survey data

Results, as presented in Fig 15, indicates that only 41% of the respondents use artificial intelligence in the legal processes. While this is so, 51,6% indicated that they do not use artificial intelligence, while 15.3% had never heard of artificial intelligence or any of its related platforms and uses. This classifies artificial intelligence as an emerging technology that is still gaining momentum among the respondents of the study. While the general usage of artificial intelligence can be talked about, it is important to note that even for those that indicated usage of artificial intelligence platforms, the majority are at the adoption stage with no meaningful results and experiences generated at this stage. During the key informant interviews with law firms, it was highlighted that it takes time to accept change, especially as it comes with the risk borne by the clients. One respondent from Zimbabwe, suggested that they are willing to take a

"receptor approach", by which adoption as by ways of learning and experience sharing. This however has a contribution to the slow rate at which the technology is being utilized in Southern Africa.

Results from the study indicate that artificial intelligence is mostly used in contract review and management as well as in text analysis. 95% of the respondents who use artificial intelligence platforms in the legal work indicated they have adopted platforms that help them analyze contracts to ensure that they are authentic, and do not miss some of the critical elements or sections as required by law and practice. 63% of the respondents who use artificial intelligence use it for analysing text to check the correctness of the subject, the relationship between their opinions and the subject matter as well as running it on the internet to analyze similar decisions or judgements made in the other jurisdictions. 93% of the respondents use artificial intelligence for casework research mainly using web-based legal casework artificial intelligence platforms such as Ross, Luminance and Diligence. Privilege classification process is generally part of casework research and text analysis as they happen while searches for data are made. It is also crucial to note that only 17% of the respondents use artificial intelligence for discovery processes. While the figure appears low, it is due to limited platforms and algorithms developed for the privilege process. Additionally, the discovery process has always been dominated by research conducted primarily by lawyers. In most legal jurisdictions, it is one step of civil procedure practice that cannot be missed. One cannot proceed with a case without discovery. Rules of civil practice state that, there has to be notification of discovery from one party followed by the discovery itself. Any documents that are not discovered or shared within the discovery stage are excluded from the case either as supporting documents or as an expert, evidence documents. Automation followed by increased usage of the automated process will reduce the amount of time spent by legal researchers on this important aspect of civil research practice.

4.5.2 Usage of artificial intelligence in law firms

Table 12: Utilization of artificial intelligence software

what do you use artificial intelligence for (Multiple Response)?		
Use	number or respondents	% frequency
Text analysis	26	63.4
Content analysis	13	31.7
Text classification	4	9.8
Casework research	38	92.7
Case predictions	2	4.9
Discovery processes	7	17.1
Contract review and management	39	95.1
Legal analytics	12	29.3
Total Respondents	41	100

Source: Survey data

Data obtained indicate a low usage of artificial intelligence in text classification and case predictions. Text classification include classifying results of each text according to certain codes, classes, and anticipated results. Some text classification algorithms can classify text according to privilege if it is programmed and well clarified. While a study conducted by Medvedeva et al. (2019) suggested that case predictions in the European Court of Human Rights amounted to more than a 65% success ratio. It further showed that natural language processing algorithms are now accounting for close to 75% accuracy levels on legal predictions in 9 of the articles of the European Convention on Human rights. This indicates greater progress towards case predictions on related articles. Such results and interest are not assimilated in South Africa and Zimbabwe primarily because predictive analytics have to be based on already coded laws and conventions. The majority of the Roman-Dutch law codes are not coded. This explains the low uptake and usage of natural language processing and machine learning among the respondents. All key informant from law firms alluded to a challenge in lack of standard codification of the AL platforms, resulting in them being alien and foreign, needed serious codification and adjustments so that they can be adapted for the African market.

The thesis sought to measure the level of satisfaction with the use of artificial intelligence among respondents. 26.8% of the respondents were very satisfied with utilizing artificial intelligence, while 58.8% were satisfied giving an 85.3% satisfaction level. The general

satisfaction has been attributed to the ability of artificial intelligence platforms to make things easier. In a subsequent response, 78% of the people who were satisfied indicated that they are satisfied because it makes work easier, while similarly in multiple responses, 56% indicated satisfaction because of the way artificial intelligence operates which is a migration from technical redundancy to more prescriptive legal analytics. 69% of the respondents were happy because it gave them anticipated results which they were able to use and adapt to their work.

4.5.3 Satisfaction with artificial intelligence

Table 13: Satisfaction with artificial intelligence

how satisfied are you with the artificial intelligence in the Job you use it for?		
Satisfaction with artificial intelligence	number of respondents	% frequency
very satisfied	11	26.8
satisfied	24	58.5
not happy	1	2.4
cannot say	5	12.2
Total Respondents	41	100

Source: Survey data

The 12% who could not give a definitive response (cannot say), indicated that they are still learning about the use of artificial intelligence in the legal sector. They are learning and seeking experience on the results-oriented nature of artificial intelligence, the effectiveness, accuracy as well and the labour redundancy function. Some respondents based their response on the issue of trust, opting to trust humans more than machines as they view the legal reasoning of a lawyer beyond replication and comprehension by machines. One respondent indicated they cannot trust an artificial intelligence-powered machine the same way they trust a 5-year trained lawyer with the same predictions. Another respondent indicated that even if they were to trust a machine powered algorithm, they would be putting themselves up for potential backlash from clients should they fail to win their cases. This makes the adoption of artificial intelligence in law firms a trial and error process through which legal liability is to be avoided at all costs.

4.6 Acceptance of artificial intelligence in the legal practice

The thesis sought to understand the extent to which artificial intelligence is accepted in the legal field in South Africa and Zimbabwe. While generally across the globe, lawyers and law firms are starting to embrace and see the value of artificial intelligence in the work that they do, adoption is still low in Zimbabwe and South Africa, where the value of a human lawyer continues to be greatly estimated.

Generally, lawyers are seen and characterized as technology luddites or technophobes, who are generally afraid of innovation and protective of changes in their profession and the way things are done. Responses from the study (Key informant interviews) show that most lawyers rather prefer the manual way of doing legal work rather than using machines. The reasoning behind has been that the value or legal work as a human resource function cannot be taken, additionally it has been argued that no machine can take up the role of a human being. This is despite many studies and literature proving a more accurate rate of legal delivery in some aspects of legal work than human beings can deliver.

Some lawyers believe that artificial intelligence presents the new legal frontier, with the potential to improve their profit margins while at the same time reducing the amount of legal work that they have to do. One respondent indicated that technology has always been a game-changer in the way the world order is arranged suggesting that failure to embrace technology will see many law firms closing between 2020 and 2025. This was augmented by one key informant who believed that the current technologies that they are developing and transforming the world if they are not championed by the legal sector for profit and efficiency purposes, they will be spearheaded by the consumer and user of legal services for the same reasons. The basis for this assertion is that it is not only the lawyer who is seeking to consolidate and monopolize their profession, other professions are also keen to break in and claim a stake. while the clients are also seeking efficient means of making enough money and time savings and achieving justice at the same time.

Some respondents have dismissed artificial intelligence applications as just the latest buzzwords, while at the same time raising concerns about the possibility of artificial intelligence-powered robots replacing lawyers. Regardless of the protective nature of the legal profession, and the general perception about the use of artificial intelligence in legal practice, most respondents thought that this is happening and there is not much that can be done to avoid it. Additionally, some key informant interview participants believed that use is already

occurring and will rapidly expand in the few years to come. Some respondents were further of the opinion that like other technological advances in the past, what evolves is the practice of law, taking it to new heights, improving how teams work, judicial decisions are made as well as process efficiency. Such sentiments indicate a general appreciation of artificial intelligence and the potential it has for changing and transforming the legal profession.

Results from the study also indicate that machine learning techniques are useful in assisting the legal practice to automate and streamline actions, thus reducing the legal costs as well as maximize efficiency, effectiveness, and productivity. This implies a deliberate approach being taken by the profession in training, developing, and resourcing the legal practice sector with artificial intelligence-powered content. Some respondents support this by suggesting that awareness-raising and marketing will ultimately increase the acceptance of artificial intelligence. Some respondents were also of the opinion that artificial intelligence is not properly marketed in the African legal sector and as such its use remains largely marginal to the extent that many people, including those in information technology, are not aware of it. Other responses came in the form of questions around the jurisdictional capacity of artificial intelligence and its ability to relate to other standard practices of law, for example, whether the artificial intelligence platforms will accommodate Roman-Dutch common law which is only practiced in Southern Africa. Such questions include questions on whether artificial intelligence developers are willing to invest in custom jurisdictions to ensure that artificial intelligence algorithms are effective.

One key informant, responding on the same issue believed that the market drives the resource thus entailing that as long as there is a general acceptance of artificial intelligence, then developers will prioritize the development of artificial intelligence platforms. Another key informant indicated that the advantages of machine learning in artificial intelligence are that it is built on procedure (command ability) and has the learning abilities to relate to each legal jurisdiction once the dictates and standards of that jurisdiction are programmed. The respondent believed that, existing platforms can generally perform any tasks in any jurisdiction as it is based on legal principles rather than legal dictates.

Some general perceptions around the acceptance of artificial intelligence points to its capacity in small law firms, which are a majority in Zimbabwe and South Africa. The average size of law firms in Zimbabwe is five lawyers per firm while in South Africa it goes to around 10 lawyers. Most of these lawyers are specialists, it is common to find in a law firm of five

lawyers, one is corporate, the other criminal, intellectual property, or insurance. The standards and practice of each are different, although they work in the same law firm. Additionally, most administrative and research tasks are performed by legal interns or junior associate lawyers. The questions to be asked then is around achieving maximum efficiency from the standard artificial intelligence platforms, if they are to be adopted. For example, there is then a need for clarity in the development of such platforms, on who will become the primary user, the senior lawyer who is more permanent, the secretary, associate, or legal intern?

On the same note, some respondents thought that artificial intelligence is more suitable for legal departments in big companies like Telkom, Econet Wireless, Vodacom, or Sasol Oil. Such responses were based on the sophistication of artificial intelligence and the huge investments needed. One respondent, when asked on the relevance of artificial intelligence to the legal practice, said, "*for huge companies like Econet and the legal departments, a very important role; for smaller law firms like ours, very less likely to make an impact*". Such perceptions have a greater impact in terms of how artificial intelligence is generally appreciated.

4.7 Financial support for investing in artificial intelligence within law firms

Table 14: Financial support and investment in artificial intelligence

Do you have a budget for artificial intelligence investments for your law firm/ organization?		
Budget for artificial intelligence	Frequency	% frequency
Yes	58	46.8
No	35	28.2
we can allocate one	31	25.0
Total Respondents	124	100

Source: Survey data

The majority of law firms including those who say they have budgets for artificial intelligence, are taking it within their research budgets. It is important to note that most law firms invest huge sums of money towards research as most legal work is based on research. Some law firms believe there is no difference in using artificial intelligence compared to human-based research and legal assistance. The majority of these have indicated that they do not have budget lines within their organizations, which can be utilized for investing in artificial intelligence.

Notably, even some law firms that are not yet utilizing artificial intelligence have allocations within their budgets that can be used for legal development. These organizations are keen on institutional development and improved knowledge management using modern technologies.

Only 4 law firms from Zimbabwe indicated that they can either allocate a budget or have a budget for investing in artificial intelligence platforms. Generally, artificial intelligence is not widely utilized in Zimbabwe except by top tech companies and its awareness is low thus attributing to a greater hesitancy by legal organizations in Zimbabwe to implement artificial intelligence.

4.8 Legal search and artificial intelligence

Artificial intelligence remains critical in improving access to data for case preparation by law firms in Zimbabwe and South Africa. 92% of the respondents who indicated, use of artificial intelligence indicated that they use it for casework research with almost half the size of that number indicating that they use it for case predictions.

Table 15: Legal search criteria in organizations

How do you perform your legal search in your law firm/Organization precedent cases?		
Search Criteria	Number of respondents	% frequency
Manual using law reports	124	100.0
Web searches	124	100.0
Cloud databases for law firms	41	33.1
Web Databases	79	63.7
artificial intelligence-powered search engines	41	33.0
Total Respondents	124	100.0

Source: Survey data

Since the legal profession is considered a learned profession where presumably each case is founded on new knowledge and knowledge processes are considered consciously functional, it was important for this study to analyze the legal search process and depict the context through which artificial intelligence can improve legal search processes. While artificial intelligence and technology continue to influence the domain of legal research, it is notable that all law

firms still use paper-based models of case research. Equally, all law firms are using a non-formatted, non-programmed web search which is mostly through Google. The majority of the data obtained is thus on the strength of Google research processes rather than legally programmed artificial intelligence engines which are more accurate compared to the general Google search results. Only 33% of the respondents indicated utilizing specific artificial intelligence-powered search engines for legal search work. The number could potentially grow considering the number of respondents using legal web databases as some of these are artificial intelligence-powered. However, some of the respondents might now be aware of the artificial intelligence behind such databases and their functionality. Those who indicated using artificial intelligence-powered legal search engines agreed that the results are better compared to ordinary web-based searches. The level of knowledge and appreciation of such however remains low and static.

Results present the opportunity for investment in legal research analytics. Very few search platforms or engines exists which can be utilized in legal research.

4.9 Knowledge of key legal artificial intelligence platforms

The study sought to understand the extent of knowledge and awareness of the six most common artificial intelligence engines utilized by lawyers globally. The basis for selecting these was the global usage and popularity among lawyers, applicability, resonance, and reach in the global outlook[29]. The thesis further looked and the potential for impact in Southern Africa as an economy that is still being influenced by artificial intelligence. As a result of the analysis, Lexis Nexis, Diligence, Ross Intelligence, Rave Law, Aletras, and DoNotPay were selected to measure general awareness and knowledge around their applicability. Table 13 presents graphically the extent of knowledge around these artificial intelligence platforms

29 These are studies in detail in the literature review section.

Table 16: Knowledge and awareness of artificial intelligence software.

Have you heard about the following artificial intelligence software?			*Current and future utilization*	
artificial intelligence Software	n	% frequency	n	% frequency
Lexis Nexis	3	2.4	3	2.4
Deiigence	9	7.3	8	6.5
Ross intelligence	18	14.5	18	14.5
Rave law	1	0.8	1	0.8
Aletras	1	0.8	1	0.8
DoNotPay	1	0.8	0	0.0

Source: Survey data

Results from the study show that most of the software despite being common globally and mostly in Europe and the Americas (USA, Canada, Australia, New Zealand) are generally not popular and well utilized in Zimbabwe and, more importantly, South Africa. Despite the low levels of knowledge and awareness around the artificial intelligence software, Ross Intelligence appeared the most known with 14.5 % of the respondents indicating they have heard of it or utilized it in the current work. This is explained because Ross is an online-based artificial intelligence search and case database for lawyers that can be utilized remotely and has two months' trial use for all prospective users so that they get a feel of its applicability. This makes it easier for lawyers to try it and experience its search and knowledge patterns. The same can also be said for Diligence which was mentioned by 7.3% of the respondents who indicated awareness of artificial intelligence. Generally, it can be concluded that remote-based, online-based and search and case-related artificial intelligence is the most known and there is potential for increased utilization. 3% of respondents are aware of Lexis Nexis having used it at trial although utilization remains very low. During an interview with Ross Intelligence, it came out there is a deliberate effort by the software provider to provide access to artificial intelligence services in an effort to improve efficiency and effectiveness in service provided. However, what remains is that those law firms utilizing the software are doing this in the context of how it is programmed for American market as there is currently no customization of the platform for the Roman Dutch legal system. There is an expectation that once this is done, the level of awareness of the software as well as utilization will increase.

While there was no response indicating use of Luminance among the responses, data suggests that the company is increasable growing its margins in southern Africa. In a follow up interview

with Luminance, it was highlighted that there is a rapid effort to develop products for southern Africa considering the importance of the market. An interview conducted with one Law firm in South Africa adopting the platform suggested that it is more user friendly and easy to customized for the local market.

4.10 Handling of key legal processes (storage and access)

The thesis looked at the storage, access, and handling of the privilege classification, contract drafting, and discovery processes as key variables. It further looked at how these were being managed by law firms. The results of the study and responses indicate a greater potential for automating these processes to ensure effectiveness and a greater economy in how they are processed and implemented. Discovery of documents relates to how case files and information is shared between different law firms representing the clients in a case/lawsuit. This is a crucial stage in a case if it is to proceed to trial. Many cases are settled at discovery where each party will measure the strength of its case against the evidence that the other party has. The discovery stage is important, if fast track resolution of cases is desirable, as it normally results in some out of court settlements and sometimes allows the case to be concluded much faster. Documents discovered are the ones solely relied on at trial. According to Theophiopulous, the law is not witchcraft where an ambush is the order of the day. As such all documents and information used in the cases should be shared with the opposition so that they have time to scrutinize it and prepare their rebuttal.

While the discovery of documents is a crucial stage in the court process, the issues of privilege are equally important but turns on whether an optional argument will be raised in defence, or in argument to try and exclude a certain document, or witness as part of the case. Such a turn of events involves documents being classified, under certain provisions of the law. Additionally, there are people whose statements are recorded for use in a case, but are not allowed to testify by law, for example, a woman may not testify against a husband, where it implicates the husband unless the husband agrees, or it is expressly provided by law. Issues of privilege are important to pick out and note as in most cases they are not clear cut and often are omitted. A person can lose a case if the attorney fails to pick out and raise the issues of privilege. Thus it is important to automate such a process using machine learning algorithms to ensure that any document with a potential privilege issue is classified as such. This helps lawyers decide how to deal with the issues of privilege that might arise in their case. Table 14

presents responses from the selected respondents on how they handle the discovery of document and privilege processes,

Table 17: Handling of discovery and privilege processes.

How do you handle your discovery privilege processes?		
Handling process	number of respondents	% frequency
Database	59	47.6
Manual	123	99.2
Dropbox/ google drive or other online platforms	71	57.3
e-discovery	6	5.0
Total	124	100.0

Source: Survey data

For those that utilize legal technologies, 47% indicated that they have databases that they use for mainly storage and filing of discovered documents. Some indicated that such information, if allowed by the client who is the primary owner of such information, they store it and transmit it to online cloud storage platforms. 57% indicated using Google drive, Dropbox, or One drive as means of preserving privileged information. In the multiple responses, set provided 99% of the respondents indicated they also utilize manual ways of dealing with documents discovered and privileged information, thereafter they file the information on computers as records.

The results thus conclude that issues of discovery and privilege are still being dealt with by law firms manually. Lawyers are still sifting through documents identifying issues, and trying to resolve them manually, unlike a system where documents are entered or put in a system that automatically analyses and discovers for them issues of privilege. Only 5% of the respondents indicated utilizing the e-discovery process, a reasonable figure considering the intensive nurture of the process. At this point, it is important to note that most lawyers are afraid of automating many elements of the legal work as it will result in time losses for them since lawyer's work is based on time. Lawyers have the ethical duty to charge fairly based on the time they have worked, and they spend many hours going through documents searching issues of privilege and to discover information for use at trial. The use of artificial intelligence in such a process is not generally welcome as it has the potential to reduce man-hours per case charged to the client.

Coupled with this, respondents were asked how much time they spend per average lengthy case dealing with issues of privilege or doing discovery. Table 15 summarizes the responses given

Table 18: Time investment in ley legal processes

How much time do you spend on discovery, Contract drafting and privilege processes?		
Time interval per average lengthy case	number of respondents	% frequency
0-3	15	12.1
4-8 hrs	7	5.6
9-16 hrs	88	71.0
17-26 hrs	12	9.7
26 hrs plus	2	1.6
Total	124	100.0

Source: Survey data

Results suggest that lawyers usually spend a combined 9 to 16 hours on a big case handling discovery or searching for privilege issues. 71% of the respondents indicated taking more than 9 hours per case, with 12% of the respondents taking less than hours. Ultimately this means lawyers make an average 7,830 Rand (540 dollars) per case on discovery and privilege if their case requires such. This is considerably a huge investment to a client on issues that can be automated.

4.11 Future artificial intelligence investments

While investment in artificial intelligence technologies remains relatively low, there is a lot of investments, going into billions, on artificial intelligence in the legal sector globally. The complexities of business operations have also resulted in increased costs of lawsuits, legal operations, and hiring lawyers for business. Additionally, this has called for a new way of doing business which was agreed by respondents to the study. In light of this respondents were asked in a multiple question response, about the legal aspects that they would like to see automated for effective service delivery. Table 16 summarizes the responses

Table 19: Anticipated automated legal services

Which of the following would you like to see automated by artificial intelligence for effective service provision?		
Type of Legal work	Automate yes	Frequency %
Contract drafting	91	73
Due diligence approvals for contracts	90	72
Automated discovery	69	55
Automated privilege	82	66
Case storage and retrieval	109	87
Precedent search	77	62
Service of process at the courts	49	39

Source: Survey data

The majority of the respondents (87%) indicated that they would like to see automation of case management systems. That is in the way cases are filed and retrieved when needed. 75% of the respondents are of the view that automating contract approval and finalization processes will help transform the legal sector. It is crucial to note is that only 66% and 55% of the respondents feel that privilege and automated discovery is important for the legal sector primarily due to the income efficient nature of the processes. 39% of the respondents believe that the service process of the courts needs to be automated as most of the time it is slow, resulting in many cases being delayed. Such a response justifies why the case completion rate in South Africa and Zimbabwe is very low.

4.12 Common challenges associated with artificial intelligence in law firms

The adoption of artificial intelligence comes with its challenges; this though is expected for any new technology. Key challenges are related to cost, output as well and capacity utilization

4.12.1 Cost of set-up

Investing in artificial intelligence technologies is considered expensive, the money required for set up needs to be budgeted and investment plans set up for the organization. Some systems need to be installed on computers while others can be administered remotely. Most respondents believe that while it is crucial to invest in technology, sometimes the huge sum needed goes beyond their budgets. Set up will also involve human capital development, which is training, finding champions to manage the new institutional developments and a market to ensure that it is well utilized and clients are aware of it

4.12.2 Legal liability and acceptance by clients

Some respondents indicated that while it might be easy to secure resources for pioneering artificial intelligence in their firms, it is important to consider the cost of buy-in and acceptance by clients. Clients may not be willing to let technology interfere with their cases. Some fundamental issues to consider will be cases to do with freedoms, property ownership, or family law cases which are absolute and losing a case would be grave to the client. It thus remains to be seen if a client is willing to put confidence into the technology. While Remus's (2017) comment that artificial intelligence is not there to replace human lawyers, may be accurate, some would question why in the first place there is a need for intelligent machines when they are not taking over from humans.

Coupled with this has been the issue of legal liability. The question asked is who will be liable for errors or mistakes made by the artificial intelligence platforms, since its work is based on legal predictions and lessons that cannot automatically be attributed to a specific element or item. Law firms are hesitant to assume liability, while at the same time it is neither desirable nor possible to place legal liabilities on the developers, except for errors and omissions which can be directly attributed to them.

4.12.3 Outcome efficiency

One notable challenge relates to the productive capacity of artificial intelligence technology. While the majority of respondents (71%) agree that artificial intelligence increases efficiency, as related to other disciplines like the media, medical, and aircraft, they remain hesitant on recognizing the outcome efficiency capabilities of artificial intelligence.

4.12.4 Harmonization with existing processes in the legal system

The nature of law is that it is based on jurisdictions, knowledge patterns and development are based on legal jurisdictions. Most artificial intelligence technologies are developed to run on the American legal system or the various European legal systems through which the foundation of law is different from the study area. While such platforms can be adopted universally they still need to be developed and refined to cater effectively for African legal systems. More importantly, such developments have to reflect the common law jurisdictive nature and the developments. A close analysis of the expert systems currently developed indicates that there are very few cases applicable in Roman-Dutch law jurisdictions.

4.12.5 Capacity and utilization challenges

Results from the study indicate that artificial intelligence technologies are highly complex and even at utilization will require support by people trained up to support the use of such systems. This means an additional burden is placed on the law firms for hiring and recruiting their support staff. Additionally, such expert systems require maximum utilization for them to achieve value for money. This is considered a challenge considering the size of law firms in the study areas. Such artificial intelligence platforms are more productive and can reach optimum capacity when implemented in large firms for commercial law departments in large corporates.

4.13 Chapter summary

This chapter presents findings from the study conducted which employed a mixed-method approach of utilizing structured questionnaires and key informant interviews. Results suggests low usage and uptake of artificial intelligence systems in the study area. It also proves that although artificial intelligence can help transform the legal practice making it more professional and efficient, it is likely to face challenges of adoption. Concerning the specific case of applicability in privilege classification and discovery, results indicate that there is a general handicap when it comes to convincing practitioners to adopt software which attacks their source of income.

Chapter 5: Conclusions and Recommendations

5.1 Introduction

This chapter presents conclusions made from the study and suggests ways by which artificial intelligence can be easily adopted in the legal profession to increase effectiveness and efficiency Conclusions and recommendations are based on the study of literature as well as the results generated from the data collected from key informants and survey respondents.

The study noted a low uptake of artificial intelligence amid growing interests and willingness to apply artificial intelligence in the majority of laws firms studied. If a considerable investment can be made, then there is bound to be a gradual rise in the number of law firms utilizing artificial intelligence platforms,

The thesis further sought to answer the research questions put forward. Conclusions that were reached are put forward in the passages below, however, it is important to point out that there is limited knowledge of artificial intelligence in law firms, and in most cases, those who are aware of artificial intelligence are mainly IT support staff. These are not influential in decision making. If IT support personnel are made champions, then use and utilization is likely to increase.

5.2 Thesis Conclusions

The thesis notes a relationship between the literature studied and the results produced from data collected in the study. Results point to the need of clarifying issues of legal liability of the artificial intelligence platforms. Despite artificial intelligence playing a huge role in assisting legal search and augmentation, it has been a challenge to gather data from the more complex cases, and usually, these are the ones that are generally not predictable. When clients decide to consult with an attorney they are governed by the fiduciary duty to act to their best abilities and deliver a favourable response to each case, whether they win it or not. Such fiduciary duty cannot be transferred to an algorithm and this has been one of the barriers to the effective utilization of artificial intelligence in the legal practice. The principal agent to the judiciary duty will always remain the attorney. While the artificial intelligence algorithm is expected to act in good faith, free of absolute manipulation and corruption, the duty of trust, is heavily placed on the attorney. In adopting such fiduciary aspects on artificial intelligence, it should be

recognized that the adoption of artificial intelligence can cause harm to the end-user as well as many other people in society. Such will result in the socially unjust utilization of computational data. Such an argument was put forward in the literature review where it was highlighted, based on Beck (2016)'s argument on legal liability. Beck argued that issues of liability should be clearly defined to create a direct correlation as it is often difficult to automate unstructured human interactions and deal with liabilities that arise from such (Remus 2016).

The conclusion is further based on the fact that most lawyers do not have adequate and specialized information technology training focused on the use and adoption of artificial intelligence technologies. The basic rules thus governing a practitioner's duties in relation to the use and adoption of technologies will need to be developed and consolidated into a framework. These rules will pertain to new models and definitions of competent client representation, what will form adequate supervision of an artificial intelligence algorithm doing its tasks, and what would then define negligence. They should also define the standards of confidentiality and how information derived is shared and communicated. Although at this point there is no ethically set rule. It is prudent to note that such roles will increase and continue to be defined with the greater and continued adoption of artificial intelligence technologies. The model offered by Dancine (2018) which has already been discussed in the literature review becomes important. While coding or modelling the law, certain rules and standards have to be maintained, which do not compromise the legal principles of discovery and privilege, but which also maintain the level of ethics that are set within the law.

There is no doubt that artificial intelligence and other forms of technology will continue to evolve and develop at an advanced stage. This will force lawyers to understand computing issues and computer science will at some point be integrated into the study of law. Ultimately lawyers need to relate to the context around their work and embrace computing capabilities. The real danger lies in overtly relying on artificial intelligence algorithms to do sophisticated legal work without comprehensive human monitoring and assistance. While technology is evolving lawyers must remember it has come to augment them and issues of liability for negligence will continue to be placed on the lawyers themselves. Such a conclusion falls within the argument that was put forward by Remus (2017) when she argued that AI should never be seen as an initiative to replace the role of lawyers, because there will always be cases that will need lawyers and technology will help them solve them.

5.3 Recommendations

Based on the study of the literature, analysis of existing artificial intelligence platforms a well as fieldwork conducted, the following recommendations are made, meant to improve the use, adoption and output realization from artificial intelligence:

1. Demystify that artificial intelligence is there to replace human beings. Adoption and use of artificial intelligence depend on how lawyers and humans perceive and see artificial intelligence. If they continue to see it as a threat, then its utilization will remain very low. This applies more specifically in developing countries like Zimbabwe and South Africa where human-centred labour is regarded highly and is well protected.
2. Rapid expansion and marketing of artificial intelligence in South Africa and Zimbabwe. Results from the study suggest that the market exists and lawyers are eager to utilize it, but the level of awareness is very law. Awareness might also need to be raised at the Law Society level. Law Societies govern the operations and conduct of lawyers. If there is a consensus at this level that artificial intelligence tools can help augment lawyers' work, the interest will likely be spread across to ensure rapid utilization.
3. Automation of artificial intelligence systems needs to be done in the context of existing programs like Oracle databases to ensure there is harmony between what law firms are currently utilizing and future technologies. This supports the argument put forward by Baker (2018) which was discussed in detail in the literature review, Baker (2018) argued that investments in AI are not wholesome and comprehensive and thus have the potential to leave some key segments behind. Artificial intelligence companies can ride on the popularity of large scale IT companies to raise the profile of their service through integration.
4. Designing artificial intelligence tools to a level of trust by humans and lawyers requires the creation of solutions that have a reflection of ethical principles embedded in human timeless values. Such systems to be adopted by normative cultural societies more specifically in Africa need to be fair, reliable, private and offer security, safe, transparent, and accountable as well as inclusive of the societal foundations of the law. This is because unlike other uses of artificial intelligence, the law is founded, and based on morality and any tools that attack the moral conscience of society is likely to face resistance to adoption and trust issues.
5. Coupled with this is the fact that people or companies involved in the designing of AI systems should try to reflect the diversities in the legal systems around the world in

which we live in. There needs to be a thorough inclusion of people involved in the subject matter for example if coding is done of the Roman-Dutch law, it should be influenced by scholars and people with deeper practical experiences in Roman Dutch law. This will ensure that acceptance and adoption will increase. While the potential of such systems to influence and increase access to justice will increase. This recommendation is based on the fact that of all existing legal tech, none has been adapted for low-income countries although these present 60% of annual legal cases across the globe.

6. If the predictions or recommendations proffered on the use of artificial intelligence are to be utilized to inform decision making, then the study recommends that it should always be critical for people to be ultimately accountable for outputs or whatever products coming out of their business. There is thus need to invest in research that seeks to understand the impact of artificial intelligence systems on human cognitive decision making, suiting it with potential liabilities and best practices.
7. With regards to issues of privilege and discovery, there is a need to embed analytical tools that deal with these in already existing artificial intelligence programs considering the sensitivity, intensity and quality needed in discovery and privilege. Discovery can be synchronized with analytical tools as well as those that predict legal outcomes to correspondwith the documents submitted and predict potential uses.
8. Automating discovery and privilege means dealing with large volumes of sensitive data. Such data is critical to the survival of organizations, whether as clients or government operations. Mishandling of such data will entail many lawsuits, spilling of trade secrets as well as disruption of the modern status quo. A data security and protection process will need to be streamlined to ensure that artificial intelligence tools are not vulnerable to being hacked, or misused to ensure the protection of personal and company data especially that which is protected by privilege, which should never get out into the world.
9. Ultimately there is a need to develop a one size fits all, multipurpose and inclusive artificial intelligence algorithm that can combine both natural language processing, deep learning and machine learning to provide solutions for the complex legal process. This has the potential to reduce the costs of law firms having more than one artificial intelligence tech product. For example, to get a comprehensive artificial intelligence package one may need to have Ross for deep search, Lex Machina for legal Analytics, Diligence for contracts, and RaveLaw for e-discovery. The potential remains for an

all-inclusive artificial intelligence platform able to relate to all legal work as this would require clients to have just one as compared to multiple subscriptions.

10. Finally, there is a need for a partnership between the industry and academia to work together in developing legal analytical techniques that determine or unearth potential prejudice to clients as well as to detect or unearth issues of unfairness. This includes the development of methods which train artificial intelligence to assess data on its origins, conversions, and characteristics.

5.4 Chapter summary

This chapter presents conclusions and recommendations derived from the thesis study. The thesis noted an intricate interconnection between the literature, and the findings from data collection. Key conclusions centre on issues of legal liability of artificial intelligence platforms, it was concluded that there is need for a clear definition, and demarcation of the extent to which artificial intelligence can be utilized in legal work, where it is expected to operate in support of existing legal work performed by lawyers. Artificial intelligence is being accepted and considered a game-changer, but there is a need to sensitize and demystify the notion that it is there to replace lawyers. If that is done, then there will be potential for increased usage of it by lawyers and law firms. Recommendations focused mostly on the need to improve the effectiveness of programs and well as increasing the general use and uptake in Southern Africa.

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APPENDIX A: Survey Questionnaire

Dear Prospective Participant

My name is **Collen Zvandasara Kufakwababa** and I am doing research with University of Stellenbosch. I am inviting you to participate in a study entitled Applying Artificial Intelligence tools to leverage legal information systems in Document Discovery and Privilege Classification processes.

If you consent to the study, may you show by signing below (to appear onsite for online signature)

How to complete the survey tool:

Questions will pop out as you complete the questionnaire. Once you start you will notice that there are questions that are mandatory. Those that you will need to answer in order to progress. Such questions give us important data and it is prudent that you give us you valid input.

There is a submit button at the end of the questionnaire, which you press for you information to be submitted. There is also an option box where you can enter your name and email. If you would like to receive feedback from data collected on the study. Please note that this is optional

1. Name of Law Firm _____ (txt_ optional)
2. Town _____ txt
3. Distance to the Service Court_____ num
4. Location _____ (can Include GPS)
5. Number of Senior partners_____ (num)
6. Number of Junior Partners _____ (num)
7. Number of Support Staff _____ (num)
8. Do you have a full time IT consultant/ employee? _____(yes/no)?
   - *If no, how do you source for your IT Services?* _____ *(txt)*

9. What IT services do you have in your organization? _____ (multiple response)
   - Internet
   - Open source email (Gmail, Yahoo, Outlook)
   - Server/Host based email
   - Employee database
   - Case database
   - Networked system
   - Legal search subscriptions

- *If Case database, what sort of database do you use? (SQL, Microsoft, Oracle, Office, Open Source)*
- *If Employee database, what sort of database do you use? (SQL, Microsoft, Oracle, Office, Open Source)*
- *If Legal Search Subscriptions, which providers are you subscribed to?*

10. How reasonable is your total it cost per year? _____ (singular tick)
    - Reasonable
    - Very high
    - High
    - Very law
    - Cheap

11. How do you search for your precedent cases? _____ (multiple response)
    - Manual using law reports
    - Online using search engines
    - We have a search platform/ software

12. If answered we have a search platform, please indicate the platform that you use;
    - *How do you subscribe to it?*
    - *Does it provide you with what you want from it on a day to day basis?*

13. If answered, we use search engines, which search engines do you use?
    - *How frequent do you access them?*
    - *Do you pay a fee to access them? ___ y/n If yes how much____ num/ USD figure*

14. Who does the legal research in your organization? ____ (multiple response)
    - Each lawyer does for themselves
    - Junior partners
    - We have a legal researcher
    - Paralegals
    - Legal assistants
    - Outsource
    - *If answered legal assistants and/or paralegals; How many do you have? ____, How are they assigned to the attorneys? _____ txt*

15. Have you heard about the following legal software? ___ multiple response
    - Nexis lexis
    - Deligense
    - Ross Intelligence
    - Rave law

16. If yes to any, do you think it can work to support Legal research processes in your organization? (follow up to each response)
    - Yes, it can work perfectly well

- Not sure how much it works
- Still need to get more information
- It does not work

17. Do you utilise South Africa/ Zimbabwe Legal Institute Platforms for Legal research? __ y/n
    - *If yes, what do you search on the platform*
    - *If yes, how long have you been utilising it for legal search*

18. How much time do you spend on case research? __ num/USD

19. How do you prepare your bills for legal research?
    - Per hour
    - Standard search cost
    - Agreeable with client
    - Law society prescribed

20. How do you handle you Document Discovery processes?
    - Manual discovery processes
    - Computerized discovery
    - *If computerized, which software do you use?*
    - *Do you pay for it? If yes, how much?*

21. How much time do you spend on discovery processes after documents have been shared or when there is a request for discovery?
    - *What are the common omissions in document discovery processes?*
    - *How do you document your discoveries?*
    - Database
    - Hard paper filling
    - Dropbox/ google drive or other online platforms
    - Filling on computer

22. How do you handle issues of privilege?
    - Manual privilege classification
    - Computerised privilege classification

    - *If computerized, which software do you use?*
    - *Do you pay for it? If yes, how much?*

23. How much time per case work do you spend on dealing with issues of privilege if there any in a specific case?
    - *What are the common omissions in Privilege classification processes?*
    - *How do you document your Privilege issues?*
    - Database
    - Hard paper filling

- Dropbox/ google drive or other online platforms
- Filling on computer

24. How do you handle issues of contract drafting?
    - Manual privilege classification
    - Computerised privilege classification

    - *If computerized, which software do you use?*
    - *Do you pay for it? If yes, how much?*

25. How much time per case work do you spend on dealing with issues of privilege if there any in a specific case?
    - *What are the common omissions in Privilege classification processes?*
    - *How do you document your Privilege issues?*
    - Database
    - Hard paper filling
    - Dropbox/ google drive or other online platforms
    - Filling on computer

26. What are the average costs that you charge for the following?
    - Dealing with issues of privilege_____ (num_curency value)
    - Drafting contracts_____ (num_curency value)
    - Working document classification_____ (num_curency value)
    - Research on thematic issues_____ (num_curency value)

27. Have you heard of Artificial intelligence? ___ y/n

28. If yes, what does it mean to you and your business? _____ txt

29. Which of the following would you like to see automated for effective service provision?
    - Contract drafting
    - Due diligence approvals for contracts
    - Automated discovery
    - Automated privilege
    - Case storage and retrieval
    - Precedent search
    - Service of process at the courts
    - Other_____ please specify

APPENDIX B: Interview Questions

Dear Participant

My name is **Collen Zvandasara Kufakwababa** and I am doing research with University of Stellenbosch. I am inviting you to participate in a study entitled: *Applying Artificial Intelligence tools to leverage legal information systems in Document Discovery and Privilege Classification processes*.

This Key Informant Interview maybe recorded and transcribed for deeper engagement latter and to ensure that no information is missed. I am hoping that we will take between 25 and 45 minutes for this discussion

Guiding questions

1. We can start by you giving me a brief background of your organization and what it does
2. How long have you been in existence doing the same work that you are currently engaged with?
3. What sort of legal technology do you utilize?
4. Tell me about your experience using and programming AI tools for legal service provision
5. Which AI platforms do you utilize?
6. In your opinion, can you say that your programme is well receive in the legal profession? Do lawyers and attorneys see the value it offers?
7. What sort of challenges or questions do you often get from the legal profession over the use of your technology?
8. How big is your market? do you see potential for growth or investment in Legal tech?
9. Do you offer your services in Southern Africa? have you made any efforts to penetrate the market or do you see and potential for legal tech investment in such countries
10. Have you considered/ do you have platforms for Document Discovery and Privilege Classification, how do they work?
    - If they do not have, probe on whether they see potential for investment in that regard
11. Can you say that you programme has reduced the cost of access to justice of effectively reduced the time litigants take to have their cases finalized?
12. How do you respond to the assertion that AI has come to replace human lawyers? is it something that you foresee your company being involved in?

13. What are the risks that you see likely affecting adoption and development of AI in issues of privilege and Document Discovery processes?